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## **GLOSSARY**

### **NUTRITION CARE PROCESS**

Nutrition Care Process is a systematic method that dietetics and nutrition professionals use to provide nutrition care. It is comprised of four steps: **nutrition assessment and reassessment, nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation.**

### **NUTRITION ASSESSMENT**

Nutritional assessment is the systematic process of collecting and interpreting information to make decisions about the nature and cause of nutrition related health issues that affect an individual.

### **NUTRITION DIAGNOSIS**

Nutrition Diagnosis is “the identification and labelling that describes an actual occurrence, risk of, or potential for developing a nutritional problem that dietetics professionals are responsible for treating independently.

### **NUTRITION INTERVENTION**

Nutrition Interventions are “purposely planned actions designed with the intent of changing a nutrition-related behaviour, risk factor, environmental condition, or aspect of health status for an individual, target group, or the community at large.

### **NUTRITION MONITORING**

Nutrition Monitoring is “the review and measurement of the patient/client/group’s status at a scheduled (preplanned) follow-up point with regard to the nutrition diagnosis, intervention plans/goals, and outcomes.”

### **NUTRITION EVALUATION**

A detailed, systematic evaluation of a patient's nutritional status conducted by healthcare providers in a team-based setting to diagnose malnutrition and identify underlying pathologies to plan intervention constitutes nutritional assessment.

### **MULTIDISCIPLINARY APPROACH**

Is a term used to describe a treatment planning approach or team that includes a number of doctors and other health care professionals who are experts in different specialties (disciplines).

Relating to, or involving, two or more disciplines that are usually considered distinct, e.g., physical therapy, urology, gynaecology.

### **IEC MATERIALS**

Information, Education and Communication (IEC) materials are used to convey public health messaging to support the overarching behaviour change strategy developed to respond to a public health problem. Print materials such as posters, brochures, flyers, billboards, etc. that are intended to draw attention to information about disease or risks to health are often called “information, education, and communication” (IEC) materials.

### **INTEGRATED DEVELOPMENT ENVIRONMENT.**

An integrated development environment (IDE) is a software application that helps programmers develop software code efficiently. It increases developer productivity by combining capabilities such as software editing, building, testing, and packaging in an easy-to-use application.

### **ANDROID PACKAGE KIT (APK)**

An APK file (Android Package Kit file format) is the file format for applications used on the Android operating system (OS). An APK file contains all the data an app needs, including all of the software program's code, assets and resources.

### **APPLICATION PROGRAMMING INTERFACE (API)**

APIs are mechanisms that enable two software components to communicate with each other using a set of definitions and protocols.

### **POLYHYDRAMNIOS**

Polyhydramnios is defined as an increase in the amniotic fluid in pregnancy and is associated with increased maternal and neonatal morbidity and mortality. The severity of this disease process varies, but up to one in five of the neonates affected by this condition are born with a congenital anomaly.

### **OLIGIHYDRAMNIOS**

Oligohydramnios is an amniotic fluid disorder resulting in decreased amniotic fluid volume for gestational age. Low amniotic fluid volumes can be the result of numerous maternal, foetal, or placental complications and can lead to poor foetal outcomes.

### **VACUUM DELIVERY**

During vacuum assisted vaginal delivery, the doctor or midwife will use a vacuum (also called a vacuum extractor) to help move the baby through the birth canal. The vacuum

extractor uses a soft plastic cup that attaches to the baby's head with suction. The doctor or midwife uses a handle on the cup to move the baby through the birth canal.

### **MACROSOMIA**

Macrosomia is an obstetric condition associated with other potentially life-threatening complications to both the mother and the foetus. The term “macrosomia” implies growth beyond an absolute birth weight, historically 4,000 g or 4,500 g, regardless of the gestational age.

### **NEONATAL HYPOGLYCAEMIA**

A low blood sugar level in newborn babies is also called neonatal hypoglycemia. It refers to low blood sugar (glucose) in the first few days after birth.

### **MULTIDISCIPLINARY ROUNDS**

Multidisciplinary rounds (MDR) constitute a patient-centered care model wherein professionals from diverse disciplines collaborate in real time to provide specialized expertise. The MDR team, encompassing care partners, hospitalists, nurses, pharmacists, and more, employs a collaborative approach that optimizes patient care through shared goals, electronic record access, regular reviews, and patient involvement.

### **PROBIOTICS**

Probiotics are live microorganisms that are intended to have health benefits when consumed or applied to the body.

### **OGTT**

Oral glucose tolerance tests (OGTT) are done to measure how well the body can process larger amounts of sugar. If the blood sugar reading is above a certain level, this could be a sign that sugar is not being absorbed fast enough by the body's organs.

### **PELVICALYCEAL DILATATION**

Renal pelvicalyceal dilatation is caused by urine retention in the upper urinary tract. It is referred to as pyelectasis in medical literature.

### **HYDRONEPHROSIS**

Hydronephrosis is swelling of one or both kidneys. Kidney swelling happens when urine can't drain from a kidney and builds up in the kidney as a result. This can occur from a blockage in the tubes that drain urine from the kidneys (ureters) or from an anatomical defect that doesn't allow urine to drain properly.

### **NUCHAL TRANSLUCENCY**

Nuchal translucency (NT) is the sonographic appearance of a collection of fluid under the skin behind the foetal neck in the first trimester of pregnancy.

### **DOLICHOCEPHALY**

An abnormality of skull shape characterized by an increased anterior-posterior diameter, i.e., an increased antero-posterior dimension of the skull. Cephalic index less than 76%. Alternatively, an apparently increased antero-posterior length of the head compared to width. Often due to premature closure of the sagittal suture.

### **IUGR**

Intrauterine growth restriction, or IUGR, is when a baby in the womb (a foetus) does not grow as expected. The baby is not as big as would be expected for the stage of the mother's pregnancy.

### **CIRCUMVALLATE PLACENTA**

Circumvallate placenta is a rare condition that occurs when the amnion and chorion fetal membranes of the placenta fold backward around the edges of the placenta.

### **CERVICAL INSUFFICIENCY**

Cervical insufficiency is the inability of the cervix to retain fetus, in the absence of uterine contractions or labor (painless cervical dilatation), owing to a functional or structural defect.

### **PRE-ECLAMPSIA**

Pre-eclampsia is a multi-system disorder specific to pregnancy, characterized by the onset of high blood pressure and often a significant amount of protein in the urine. When it arises, the condition begins after 20 weeks of pregnancy.

### **ECLAMPSIA**

Eclampsia is a severe complication of preeclampsia. It's a rare but serious condition where high blood pressure results in seizures during pregnancy.

### **ORAL HYPOGLYCAEMIC AGENTS (OHA)**

Oral hypoglycaemic agents (OHAs) are a group of drugs used to help reduce the amount of sugar present in the blood. OHAs are usually used in the treatment of adult-onset diabetes (also known as Type 2 or non-insulin dependent diabetes mellitus).

### **NEONATAL HYPERBILIRUBINEMIA**

Neonatal hyperbilirubinemia, defined as a total serum bilirubin level above 5 mg per dL (86  $\mu$ mol per L), is a frequently encountered problem. Although up to 60 percent of term newborns have clinical jaundice in the first week of life, few have significant underlying disease.

### **RESPIRATORY DISTRESS SYNDROME**

A common breathing disorder that affects newborns. Respiratory Distress Syndrome occurs most often in babies born before their due date, usually before 28 weeks of pregnancy. Less often, RDS can affect full-term newborns.

### **PERINEAL TEAR**

Vaginal tears are common during childbirth. They often happen when a baby's head is coming through the vaginal opening. These tears usually are a result of the head being too large for the vagina to stretch around. Or the vagina doesn't stretch easily. Vaginal tears also are called perineal lacerations or perineal tears.

### **POSTPARTUM HAEMORRHAGE**

Postpartum haemorrhage is a severe vaginal bleeding after childbirth. It is a serious condition that can lead to death. Other signs of postpartum haemorrhage are dizziness and blurred vision. Postpartum haemorrhage can occur after delivery up to to 12 weeks postpartum.

### **PRIMIPARA**

A woman who has had one birth at more than 20 weeks' gestation, regardless of whether the infant is born alive or dead."

### **MULTIPARA**

A woman who has had two or more pregnancies resulting in potentially viable offspring. The term para refers to births. A para III has had three such pregnancies; a para VI or more is also known as a grand 'multipara.

### **GRAVIDITY**

Gravidity is defined as the number of times that a woman has been pregnant.



# Appendices

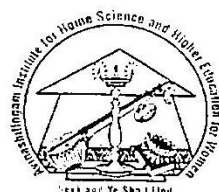
## APPENDIX I

### Institutional Human Ethics Committee Clearance Certificate of Avinashilingam Institute for Home Science and Higher Education for Women

#### INSTITUTIONAL HUMAN ETHICS COMMITTEE

#### *Avinashilingam*

Institute for Home Science and Higher Education for Women  
(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3  
of UGC Act 1956) Re-accredited with 'A++' Grade by  
NAAC. Recognised by UGC Under Section 12 B  
Coimbatore-641 043, Tamil Nadu, India



#### **Chairman**

Dr. S. Ramalingam  
Principal, PSG Institute  
of Medical Sciences  
& Research, Coimbatore

#### **Member Secretary**

Dr. S. Uma Mageshwari  
Professor and Head,  
Department of Food Service  
Management & Dietetics

#### **Members**

Mr. K. Arunima (Legal Expert)  
Dr. Subhasini K. Sripathi  
Dr. A. Saraswathy  
Ms. D. Kavitha  
Dr. S. Muthukakshmi  
Dr. G. Victoria Naomi  
Dr. Judith. Justin  
Dr. Anitha Subash

3<sup>rd</sup> December 2020

To  
Ms. Sindhu.S  
Department of Food Service and Management  
Avinashilingam Institute for Home Science and  
Higher Education for Women  
Coimbatore – 641 043

Dear Sindhu,

Ref: Your proposal No. IHEC/19-20/FSMD/26 entitled  
“Development and Optimisation of a Sustainable Standard Operating  
Protocol for GDM Women for Improved Medical Nutrition Therapy  
and Maternal Foetal Outcomes” submitted for approval to IH C

The Institutional Human Ethics Committee of our University  
hereby grants approval to your research proposal No. IHEC/19-  
20/FSMD/26 entitled “Development and Optimisation of a  
Sustainable Standard Operating Protocol for GDM Women for  
Improved Medical Nutrition Therapy and Maternal Foetal  
Outcomes” submitted by you. The Approval number for the same is  
AUW/IHEC/FSMD-19-20 :XPD-26.

We wish you all the best in your research endeavours.

Regards,

*S. Uma Mageshwari*  
Dr. S. Uma Mageshwari  
Member Secretary



**APPENDIX II**  
**Ethical Clearance**  
**Certificate of Aster Medcity, Kochi, Kerala**

**AsterMedcity**  
We'll Treat You Well™

**SCIENTIFIC RESEARCH COMMITTEE APPROVAL LETTER**


Date: 24/05/2019  
Ref. No. Aster Scientific Research Committee/cert/100

To  
Ms.Sindhu S.,  
Ph D. Candidate,  
Dept. of FSMD,  
Avinashilingam Deemed University, Coimbatore.

Dear Ms.Sindhu S.,

The Scientific Research Committee meeting held at our institute on 24/05/2019 has reviewed and discussed the study submitted by you, titled "Development and evaluation of a SSOP (Sustainable Standard Operating Protocol) for Gestational Diabetes Mellitus women for improved MNT (Medical Nutrition Therapy) and maternal foetal outcome."

The study is **approved** by the Committee for Phase I (To collect data by questionnaires)..  
Candidate has to present the findings <sup>of Phase I</sup> to the Scientific Committee.

  
Chairman,  
Scientific Research Committee,  
Aster Medcity.



**Members of the Scientific Review Committee**

Dr.T.R.John, Chief of Medical Services-Chairman  
Dr. Geetha Philips, Lead Senior Consultant,General Medicine-Convener  
Dr. V. Narayanan Unni-Director,Academic Affairs & Lead Senior Consultant-Nephrology  
Dr. Dilip Panicker- Lead Senior Consultant - Neurosurgery  
Dr.Jem Kalathi, Lead Senior Consultant, Surgical Oncology  
Dr. Ramaswamy N V,Consultant,Hemato-Oncology  
Dr. Anup R. Warriar, Consultant Infectious Diseases  
Dr.Biji K.S.Consultant,Biochemistry  
Ms.Abin Francis- Biostatistician

Aster DM Healthcare Ltd.  
Kuttisahib Road, Near Kothad Bridge, South Chittoor PO, Cheranallur, Kochi 682027, Kerala, India  
T +91 484 6699999 E info@astermedcity.com W astermedcity.com  
CIN: U85110KL2008PLC021703



## APPENDIX III

## Ethical Clearance Certificate of Amrita Institute of Medical Sciences, Kochi, Kerala



Dated: 16-04-2019  
IRB-AIMS-2019-079

To  
Ms. Sindhu S  
Ph.D (Part Time) Research Scholar  
Dept. of Food Services Management and Dietetics  
Avinashilingam Institute of Home-science and  
-Higher Education for Women, Coimbatore.

The Institution Review Board (IRB) meeting was held on 16-04-2019 at 3 pm in the Conference room at 7<sup>th</sup> floor of medical college with Dr. Prathapan Nair as Chairperson. The following members attended the meeting.


Dr. Prathapan Nair	Dr. D.M. Vasudevan
Dr. Chandrasekhar	Dr. Manuraj
Dr. Muralee Damodaran	Dr. Aweek Jayant
Dr. Sivakumar.V	Mrs. May Abraham
Adv. Manju Paul.	

The IRB reviewed the submitted documents pertaining to the study protocol titled "Development and evaluation of a SSOP (Substantial Standard Operating Protocol) for gestational diabetes mellitus for improvement MNT (Medical Nutrition Therapy) and maternal foetal outcome" submitted by Ms. Sindhu. S, Ph.D research scholar, Avinashilingam Institute of Home Science and Higher Education for Women, Coimbatore.

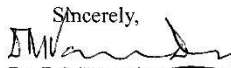
The purpose of this submission is to obtain sanction from appropriate authority at AIMS, Kochi for her questionnaire-based study involving doctors and other health care providers at this institution, which is among the few selected for her doctoral- research work. Data shall be collated from all recently admitted and discharged Gestational Diabetes patients and from those who are nearing delivery as well. The maternal and fetal risk factors will be analysed with the aim of developing a SOP for medical nutritional therapy aimed to benefit this category of patients.

Ethical clearance is given and approval of the study is granted. Written consent shall be obtained from all the study participants. Appropriate credit for the institution shall be shared in any publications of this study. The PI shall submit the detailed final report at the closure of the study.

cc: IRB, AIMS

Authentication:   
I.....



Sincerely,  
  
Dr. D.M. Vasudevan  
Member Secretary.



AIMS Ponekkara P.O. Kochi, Kerala 682 041. Phone: +91- 484- 285 1234. Fax: +91-484-285 2020 E-mail: md@aims.amrita.edu

## APPENDIX IVa

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Obstetrician)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Obstetrician/Gynaecologist)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT= Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Doctor: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation		
<input type="checkbox"/> Others _____		
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------

16. Do you think a protocol based flow chart can be helpful in adjusting insulin dosage for GDM women?  
 Strongly Agree     Agree    Neutral     Disagree     Don't know
17. In a year, roughly how many women come to your institution for their antenatal check up?  
 <25     25-100     101-500     > 500
18. On an average how many pregnant women with gestational diabetes mellitus (GDM) do you see in your practice in ONE MONTH?  
 0-5     6-10     11-15     >15
19. Do all pregnant women undergo an initial screening for GDM during their first visit with the doctor in your institution?  
 Yes     No     Don't know     If No, at what stage \_\_\_\_\_
20. What is the mean week of gestation at which you screen for GDM?  
 Before 8 weeks    8-12 weeks    12-16 weeks    16-20 weeks    20-24 weeks    24-28 weeks    28-32 weeks
21. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  
 Yes    No    Don't know    If yes, specify \_\_\_\_\_
22. In your practice what are the possible foetal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Spontaneous Abortions    Birth Injuries    Big babies/Excessive Weight gain    Congenital Malformations    Neonatal Hypoglycaemia    Others \_\_\_\_\_
23. In your practice what are the possible maternal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Obstructed/ Prolonged Labour    Polyhydramnios/Oligohydramnios    Abortion/ Miscarriage/ Still birth    Assisted Labour (Forceps/Vacuum/ Caeserian)    Post partum Hemorrhage    Others \_\_\_\_\_
24. Is Single Step Glucose Test using 75g oral glucose and measuring blood glucose 2 hrs after ingestion done as the usual diagnostic test for GDM at your institution?  
 Yes    No    Others (specify) \_\_\_\_\_
25. Do you do the OGTT in a fasting or non-fasting state?  
 Fasting     Non-fasting
26. Type of blood sample used for OGTT (please tick one)  
 Venous     Capillary     Not sure
27. Which blood samples are drawn during the OGTT? (Please tick all that apply)  
 0h    1h    2h    3h    Others (please specify)
28. Which criteria do you use to diagnose GDM? \_\_\_\_\_
29. Do you usually give an Endocrinologist/Diabetologist/General Physician referral as soon as GDM is confirmed?  
 Yes    No    If No, at what stage is it given \_\_\_\_\_
30. If any woman is tested positive for GDM for the first time, what is the first line of treatment strategy followed at your institution?  
 \_\_\_\_\_  
 \_\_\_\_\_
31. In your practice which is/are your preferred drug(s) of choice in the treatment of GDM? Please give reasons.  
 \_\_\_\_\_  
 \_\_\_\_\_
32. At what stages of gestation is USG specifically conducted for GDM women by you? Please give reasons.  
 \_\_\_\_\_
33. In your practice are there any special analytical tests/ estimations recommended for GDM women?  
 \_\_\_\_\_  
 \_\_\_\_\_
35. If a GDM woman develops hypoglycaemia, what is the immediate plan of treatment recommended by you?  
 \_\_\_\_\_  
 \_\_\_\_\_
36. In GDM cases where there is very high 2 hr PPBS, what is the usual protocol followed by you in your institution?  
 \_\_\_\_\_  
 \_\_\_\_\_

37. In your institution what precautionary procedures/treatment plans are employed for GDM women requiring early delivery?

\_\_\_\_\_

\_\_\_\_\_

38. What preliminary procedures or treatment plans are usually suggested by you just before labour/delivery in GDM women?

\_\_\_\_\_

\_\_\_\_\_

39. If hypoglycaemia is detected in the baby of a GDM mother after delivery, what is the immediate treatment strategy employed for managing it at your institution?

\_\_\_\_\_

\_\_\_\_\_

41. When do you routinely deliver your GDM patients?

- 36 weeks  37 weeks  38 weeks  39 weeks  40 weeks  Only at full term

42. When is the first postnatal appointment?

- 4 weeks  6 weeks  3 months  6 months

43. Do you advise a post natal GTT for all women with GDM?

- Yes  No  Others (please specify) \_\_\_\_\_

44. If yes, when do you advise this?

- within 6 weeks post partum  6-12 weeks post partum  >12 weeks post partum

45. According to you how long should the follow up and evaluation of GDM mothers continued after delivery?

- Upto 3 months  3-6 months  6-12 months  Upto 12 months  Every year

## APPENDIX IVb

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Diabetologist)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Diabetologist/Endocrinologist/Physician)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT = Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Doctor: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation	<input type="checkbox"/> Others _____	
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------

16. Do you think a protocol based flow chart can be helpful in adjusting insulin dosage for GDM women?  
 Strongly Agree     Agree    Neutral     Disagree     Don't know
17. On an average how many pregnant women with gestational diabetes mellitus (GDM) do you see in your practice in ONE MONTH?  
 0-5     6-10     11-15     >15
18. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  
 Yes    No    Don't know    If yes, specify \_\_\_\_\_
19. In your practice what are the possible foetal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Spontaneous Abortions    Birth Injuries    Big babies/Excessive Weight gain    Congenital Malformations    Neonatal Hypoglycaemia    Others \_\_\_\_\_
20. In your practice what are the possible maternal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Obstructed/ Prolonged Labour    Polyhydramnios/Oligohydramnios    Abortion/ Miscarriage/ Still birth    Assisted Labour (Forceps/Vacuum/ Caeserian)    Post partum Hemorrhage    Others \_\_\_\_\_
21. Is Single Step Glucose Test using 75g oral glucose and measuring blood glucose 2 hrs after ingestion done as the usual diagnostic test for GDM at your institution?  
 Yes    No    Others (specify) \_\_\_\_\_
22. Do you do the OGTT in a fasting or non-fasting state?  
 Fasting     Non-fasting
23. Type of blood sample used for OGTT (please tick one)  
 Venous     Capillary     Not sure
24. Which blood samples are drawn during the OGTT? (Please tick all that apply)  
 0h    1h    2h    3h    Others (please specify)
25. Which criteria do you use to diagnose GDM? \_\_\_\_\_
26. What is the threshold blood glucose level taken as cut off for diagnosis for GDM in your practice? \_\_\_\_\_
27. Are you usually given a referral as soon as GDM is confirmed for any pregnant woman?  
 Yes    No   If No, at what stage is it given \_\_\_\_\_
28. If any woman is tested positive for GDM for the first time, what is the first line of treatment strategy followed at your institution?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
29. In your practice which is/are your preferred drug(s) of choice in the treatment of GDM? Please give reasons.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
30. For an already diabetic pregnant woman on medications (OHA/ Insulin/Insulin Analogues etc.) can you elaborate on the treatment strategy followed by you? (Change of medications, dosage, cut off values for blood glucose, patient education etc.)  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
31. Are there any special analytical tests/ estimations recommended for GDM women?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
32. In your practice, what are the pre-conception precautionary measures recommended for women with past history of GDM or DM?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

33. If a GDM woman develops hypoglycaemia, what is the immediate plan of treatment recommended by you?

\_\_\_\_\_  
\_\_\_\_\_

34. In GDM cases where there is very high 2 hr PPBS, what is the usual protocol followed by you in your institution?

\_\_\_\_\_

35. If hypoglycaemia is detected in the baby of a GDM mother after delivery, what is the immediate treatment strategy employed for managing it at your institution?

\_\_\_\_\_  
\_\_\_\_\_

36. In your institution who are the significant health care professionals involved in the treatment and management of GDM women?

\_\_\_\_\_  
\_\_\_\_\_

37. Do you see **ALL** of your GDM patients post partum?

Yes  No If No, in which conditions are they seen? \_\_\_\_\_

38. If yes, do you advice a post natal GTT for all women with GDM?

Yes  No  Others (please specify) \_\_\_\_\_

39. If yes, when do you advice this?

within 6 weeks post partum  6-12 weeks post partum  >12 weeks post partum

40. According to you how long should the follow up and evaluation of GDM mothers continued after delivery?

Upto 3 months  3-6 months  6-12 months  Upto 12 months  Every year  Others (please specify) \_\_\_\_\_

## APPENDIX IVc

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Neonatologist)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Neonatologist/Paediatrician)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT = Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors

1. a. Name of the Doctor: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation	<input type="checkbox"/> Others _____	
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion can maintenance of normoglycemia in GDM mothers result in reduced neonatal adverse outcomes?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
16. In your practice what are the possible foetal risks/outcomes seen in GDM cases? (multiple responses are allowed)
 

<input type="checkbox"/> Spontaneous Abortions	<input type="checkbox"/> Birth Injuries	<input type="checkbox"/> Big babies/Excessive Weight gain	<input type="checkbox"/> Congenital Malformations	<input type="checkbox"/> Neonatal Hypoglycaemia
<input type="checkbox"/> Others _____				

17. In your practice are there any special analytical tests/ estimations recommended for GDM women? (specific to foetal complications/problems during gestation)

---

---

18. If hypoglycaemia is detected in the baby of a GDM mother after delivery, what is the immediate treatment strategy employed for managing it at your institution?

---

---

19. In your institution who are the significant health care professionals involved in the treatment and management of GDM women?

---

---

20. In your practice, is there any specific evaluation procedures/tests recommended for new born babies of GDM mothers?  
 Yes  No If Yes , what are they? \_\_\_\_\_

21. In your practice, do you recommend a follow up or review for **all** the babies born to GDM women?  
 Yes  No If No, in which situations/conditions is it done and when?

---

---

22. According to you are there any specific stage(s) of gestation or condition in a GDM woman which requires her to be seen by a neonatologist/paediatrician/perinatologist for further evaluation?

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## APPENDIX IVd

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Dietitian)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Dietitian)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT= Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Dietitian: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation		
<input type="checkbox"/> Others _____		
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------

16. On an average how many pregnant women with gestational diabetes mellitus (GDM) do you see in your practice in ONE MONTH?  
 0-5     6-10     11-15     >15
17. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  
 Yes  No  Don't know  If yes, specify \_\_\_\_\_
18. Do all pregnant women undergo an initial screening for GDM during their first visit with the doctor in your institution?  
 Yes     No     Don't know     If No, at what stage \_\_\_\_\_
19. In your practice what are the possible foetal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Spontaneous Abortions  Birth Injuries  Big babies/Excessive Weight gain  Congenital Malformations  Neonatal Hypoglycaemia  Others \_\_\_\_\_
20. In your practice what are the possible maternal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Obstructed/ Prolonged Labour  Polyhydramnios/Oligohydramnios  Abortion/ Miscarriage/ Still birth  Assisted Labour (Forceps/Vacuum/ Caeserian)  Post partum Hemorrhage  Others \_\_\_\_\_
21. Is Single Step Glucose Test using 75g oral glucose and measuring blood glucose 2 hrs after ingestion done as the usual diagnostic test for GDM at your institution?  
 Yes  No  Others (specify) \_\_\_\_\_
22. In your institution who is/are the health care professional(s) involved in counselling, motivation, reassurance of the anxious GDM woman.(multiple responses are allowed)  
 Doctors     Nurses     Diabetic Educator     Dietitians     Psychologist/ Counsellors  Physiotherapist  
 Others (specify) \_\_\_\_\_
23. Is maternal nutrition assessment mandatory for ALL GDM women undergoing treatment in your institution?  
 Yes  No  Don't know  If No, at when is it done \_\_\_\_\_
- 
24. Do you use any operating guidelines/ recommendations as a reference in the MNT of GDM women?  
 Yes  No  Don't know  If yes, specify \_\_\_\_\_
25. Can you elaborate on how the MNT for GDM women is planned in your practice? (initial screening, calculation of nutrients, diet prescription, antenatal follow up, review after delivery, etc.)
26. In your practice which the factors greatly the need for frequent diet consultations  
 Glycaemic control     Dietitian;s clinical judgement     Doctor;s referral     Patient doubts     Departmental or Institutional Protocol     Scheduled appointment with doctor
27. Type of diet consultation done mostly for GDM women  
 Individual diet consultation  Group education     Individual and Group education
28. Duration of diet consultation done per client  
 less than 30 min     30-60 min     greater than 60 min
29. How many diet consultation per client is given throughout the course of a GDM pregnancy  
 1     2     3     4 or more
30. In your practice which are the major topics covered while giving dietetic advice on GDM (Please choose any ten mostly discussed topics only)  
 Carbohydrate quantity and distribution  Protein requirement  Fat requirement and type of fat  Pregnancy specific micronutrients  Small frequent meal pattern  Physical activity  Weight gain pattern  Hypoglycaemia  Artificial sweeteners  
 Fibre  Food safety  Food groups  Self monitoring of blood glucose  Post prandial blood glucose target levels  Free foods  
 Food label reading  Salt and fluid intake  Review visit  Post natal diet  Breast feeding
31. Your level of confidence in providing dietetic advice in the management of GDM  
 Not confident  1     2     3     4 Very confident
32. Your level of understanding of current evidence based guidelines on nutritional management of GDM  
 Needs improvement  1     2     3     4 Excellent

## APPENDIX IVe

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Diabetes Educator)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Diabetic Educator)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT = Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Doctor: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
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7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation		
<input type="checkbox"/> Others _____		
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------

16. Do you think a protocol based flow chart can be helpful in adjusting insulin dosage for GDM women?  
 Strongly Agree     Agree     Neutral     Disagree     Don't know
17. On an average how many pregnant women with gestational diabetes mellitus (GDM) do you see in your practice in ONE MONTH?  
 0-5     6-10     11-15     >15
18. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  
 Yes     No     Don't know     If yes, specify \_\_\_\_\_
19. In your practice what are the possible foetal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Spontaneous Abortions     Birth Injuries     Big babies/Excessive Weight gain     Congenital Malformations     Neonatal Hypoglycaemia     Others \_\_\_\_\_
20. In your practice what are the possible maternal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Obstructed/ Prolonged Labour     Polyhydramnios/Oligohydramnios     Abortion/ Miscarriage/ Still birth     Assisted Labour (Forceps/Vacuum/ Caeserian)     Post partum Hemorrhage     Others \_\_\_\_\_
21. Is Single Step Glucose Test using 75g oral glucose and measuring blood glucose 2 hrs after ingestion done as the usual diagnostic test for GDM at your institution?  
 Yes     No     Others (specify) \_\_\_\_\_
22. Is the OGTT done in a fasting or non-fasting state in your institution?  
 Fasting     Non-fasting
23. Type of blood sample used for OGTT (please tick one)  
 Venous     Capillary     Not sure
24. Which blood samples are drawn during the OGTT? (Please tick all that apply)  
 0h     1h     2h     3h     Others (please specify)
25. Which criteria is used to diagnose GDM? \_\_\_\_\_
26. Are you usually given a referral as soon as GDM is confirmed for any pregnant woman?  
 Yes     No    If No, at what stage is it given \_\_\_\_\_
27. If any woman is tested positive for GDM for the first time, what is the first line of treatment strategy followed at your institution?  
 \_\_\_\_\_
28. For an already diabetic pregnant woman on medications (OHA/ Insulin/Insulin Analogues etc.) can you elaborate on the treatment strategy followed by you? (Cut off values for blood glucose, patient education etc.)  
 \_\_\_\_\_
29. In your practice, what are the pre-conception precautionary measures recommended for women with past history of GDM or DM?  
 \_\_\_\_\_
30. Can you elaborate on how a treatment plan is made by you (as a Diabetic Educator) for a GDM woman? (Initial screening, patient education, adjusting insulin dosages, follow up/review sessions etc.)  
 \_\_\_\_\_
31. Do you see **ALL** of your GDM patients post partum?  
 Yes     No    If No, in which conditions are they seen? \_\_\_\_\_
32. If yes, is there a post natal GTT done for all women with GDM?  
 Yes     No     Others (please specify) \_\_\_\_\_
33. If yes, when is it done?  
 within 6 weeks post partum     6-12 weeks post partum     >12 weeks post partum
34. According to you how long should the follow up and evaluation of GDM mothers continued after delivery?  
 Upto 3 months     3-6 months     6-12 months     Upto 12 months     Every year     Others (please specify)

## APPENDIX - IV

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Physiotherapist)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Physiotherapist/Yoga Instructor)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT= Medical Nutrition Therapy Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Physiotherapist/Yoga Instructor: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation		
<input type="checkbox"/> Others _____		
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------

16. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  Yes  No  Don't know  If yes, specify \_\_\_\_\_
17. Do all pregnant women undergo an initial screening for GDM during their first visit with the doctor in your institution?  Yes  No  Don't know  If No, at what stage \_\_\_\_\_
18. In your practice what are the possible foetal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Spontaneous Abortions  Birth Injuries  Big babies/Excessive Weight gain  Congenital Malformations  Neonatal Hypoglycaemia  Others \_\_\_\_\_
19. In your practice what are the possible maternal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Obstructed/ Prolonged Labour  Polyhydramnios/Oligohydramnios  Abortion/ Miscarriage/ Still birth  Assisted Labour (Forceps/Vacuum/ Caeserian)  Post partum Haemorrhage  Others \_\_\_\_\_
20. Do you think a protocol based flow chart can be helpful in planning a physical activity regimen for GDM women?  
 Strongly Agree  Agree  Neutral  Disagree  Don't know
21. In your institution who is/are the health care professional(s) involved in counselling, motivation, reassurance of the anxious GDM woman.(multiple responses are allowed)  
 Doctors  Nurses  Diabetic Educator  Dietitians  Psychologist/ Counsellors  Physiotherapist  
 Others (specify) \_\_\_\_\_
22. Is there a physiotherapist consultation for physical activity given for **all** GDM women undergoing treatment in your institution?  Yes  No  Does not exist  
If No, in which conditions/ situations is it given? \_\_\_\_\_
23. Can you elaborate on how the physical activity regimen is planned for GDM women in your practice? (Initial screening, type and duration of physical activity, stage of gestation, follow up/review after delivery, etc.)  
\_\_\_\_\_  
\_\_\_\_\_

## APPENDIX IVg

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Nurse)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Nurse OB/GYN)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT= Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Nurse: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation	<input type="checkbox"/> Others _____	
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------

16. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  Yes  No  Don't know  If yes, specify \_\_\_\_\_
17. Do all pregnant women undergo an initial screening for GDM during their first visit with the doctor in your institution?  Yes  No  Don't know  If No, at what stage \_\_\_\_\_
18. In your practice what are the possible foetal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Spontaneous Abortions  Birth Injuries  Big babies/Excessive Weight gain  Congenital Malformations  Neonatal Hypoglycaemia  Others \_\_\_\_\_
19. In your practice what are the possible maternal risks/outcomes seen in GDM cases? (multiple responses are allowed)  
 Obstructed/ Prolonged Labour  Polyhydramnios/Oligohydramnios  Abortion/ Miscarriage/ Still birth  Assisted Labour (Forceps/Vacuum/ Caesarian)  Post partum Haemorrhage  Others \_\_\_\_\_
20. Is Single Step Glucose Test using 75g oral glucose and measuring blood glucose 2 hrs after ingestion done as the usual diagnostic test for GDM at your institution?  
 Yes  No  Others (specify) \_\_\_\_\_
21. Do you think a protocol based flow chart can be helpful in adjusting insulin dosage for GDM women?  
 Strongly Agree  Agree  Neutral  Disagree  Don't know
22. In your institution who is/are the health care professional(s) involve in educating GDM women on insulin delivery devices, storage, disposal, sites for insulin injection etc.(multiple responses are allowed)  
 Doctors  Nurses  Diabetic Educator  Dietitians  Others (specify) \_\_\_\_\_
23. What is the threshold blood glucose level taken as cut off for diagnosis for GDM in your practice?  
 \_\_\_\_\_
24. If any pregnant woman is tested positive for GDM for the first time, what is the first line of treatment strategy followed at your institution?  
 \_\_\_\_\_
25. In your institution which is/are the usually preferred drug(s) of choice used in the treatment of GDM?  
 \_\_\_\_\_
26. If a GDM woman develops hypoglycaemia, what is the immediate plan of treatment recommended in your institution?  
 \_\_\_\_\_  
 \_\_\_\_\_
27. In GDM cases where there is very high 2 hr PPBS, what is the usual protocol followed in your institution?  
 \_\_\_\_\_  
 \_\_\_\_\_
28. In your institution what precautionary procedures/treatment plans (pertaining to Nursing Care) are employed for GDM women requiring early delivery?  
 \_\_\_\_\_  
 \_\_\_\_\_
29. What preliminary procedures or treatment plans (pertaining to Nursing Care) are usually followed in your institution just before delivery/labour in GDM women?  
 \_\_\_\_\_  
 \_\_\_\_\_
30. If hypoglycaemia is detected in the baby of a GDM mother after delivery, what is the immediate treatment strategy employed for managing it at your institution?  
 \_\_\_\_\_  
 \_\_\_\_\_
31. Can you elaborate on how the Nursing Care Plan for GDM women is done in your practice? (screening, routine charting, specific procedures/treatment, etc.)  
 \_\_\_\_\_  
 \_\_\_\_\_

## APPENDIX IVh

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Biochemist)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Biochemist)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT= Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Biochemist: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation		
<input type="checkbox"/> Others _____		
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------

16. Do you think a protocol based flow chart can be helpful in doing biochemical tests for GDM women?  
 Strongly Agree     Agree    Neutral     Disagree     Don't know
17. On an average how many pregnant women with gestational diabetes mellitus (GDM) do you see in your practice in ONE MONTH?  
 0-5     6-10     11-15     >15
18. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  
 Yes    No    Don't know    If yes, specify \_\_\_\_\_
19. Is Single Step Glucose Test using 75g oral glucose and measuring blood glucose 2 hrs after ingestion done as the usual diagnostic test for GDM at your institution?  
 Yes    No    Others (specify) \_\_\_\_\_
20. Is the OGTT in a fasting or non-fasting state?  
 Fasting     Non-fasting
21. Type of blood sample used for OGTT (please tick one)  
 Venous     Capillary     Not sure
22. Which blood samples are drawn during the OGTT? (Please tick all that apply)  
 0h    1h    2h    3h    Others (please specify)
23. Which criteria is used to diagnose GDM in your institution? \_\_\_\_\_
24. Can you elaborate on how the biochemical tests are planned for GDM women in your practice? (steps involved, reporting criteria, blood sample collection, instructions given to patients etc.)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## APPENDIX IVi

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Psychologist)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Counsellor/Psychologist/MSW)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT = Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Nurse: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation		
<input type="checkbox"/> Others _____		
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  Yes  No  Don't know  If yes, specify \_\_\_\_\_

16. Do all pregnant women undergo an initial screening for GDM during their first visit with the doctor in your institution?  
 Yes     No     Don't know     If No, at what stage\_\_\_\_\_

17. Can you elaborate on how a counselling regimen is planned for a GDM woman in your practice? (initial screening, type of session advised, follow up/review sessions after delivery, etc.)

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## APPENDIX IVj

## Questionnaires used for Baseline Survey of Current Practices and Protocols in Management of Gestational Diabetes Mellitus (Quality Control Manager)

Gestational Diabetes Mellitus (GDM) – Practice Patterns in ErnakulamA Questionnaire for (Quality Control Manager)

Instructions for filling up the questionnaire

Given below are some statements and questions about Gestational Diabetes Mellitus.

Place a tick (✓) mark in the option that you believe is closest to your opinion.

Make sure that you have answered all the questions and statements.

Note: GDM = Gestational Diabetes Mellitus, SOP = Standard Operating Protocols, MNT= Medical Nutrition Therapy, Health Care Professionals – Doctors, Nurses, Dietitians, Physiotherapist, Psychologists, Counsellors.

1. a. Name of the Quality Control Manager: \_\_\_\_\_ b. Name of the institution where you practice: \_\_\_\_\_
2. Primary type of the institution in which you practice
 

<input type="checkbox"/> Private OB/GYN Clinic/Hospital	<input type="checkbox"/> Government Primary Health Centre
<input type="checkbox"/> Government Maternity Hospital	<input type="checkbox"/> Private Multispeciality Hospital/Centres
<input type="checkbox"/> Government General Hospital	
3. Gestational Diabetes Mellitus (GDM) is on the rise like Diabetes Mellitus in India.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
4. Incidence of GDM is more in urban areas than rural areas
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
5. What according to you are the major risk factors for GDM? (multiple responses are allowed)
 

<input type="checkbox"/> Family History	<input type="checkbox"/> Diagnosed in Previous Pregnancy	<input type="checkbox"/> Obesity	<input type="checkbox"/> Higher Maternal Age
<input type="checkbox"/> Others _____			
6. Do you think GDM is a risk factor for future Type 2 Diabetes Mellitus
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
7. What according to you can be the possible future health consequences for the children born to GDM mothers? (multiple responses are allowed)
 

<input type="checkbox"/> Glucose Intolerance	<input type="checkbox"/> Type 2 DM in Childhood and Adolescence	<input type="checkbox"/> Obesity	<input type="checkbox"/> Cardiovascular disorders
<input type="checkbox"/> Others _____			
8. What measures will you suggest to reduce incidence of GDM at national level? (multiple responses are allowed)
 

<input type="checkbox"/> Early diagnosis and Detection of GDM	<input type="checkbox"/> Evidence based treatment strategies	<input type="checkbox"/> Health and Nutrition Education
<input type="checkbox"/> Regular Follow up and Evaluation	<input type="checkbox"/> Others _____	
9. A team approach in treatment and overall management of GDM ensures better outcome
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
10. Evidence based national guidelines for diagnosis and management of GDM are essential to control and prevent GDM
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
11. Standard operating protocols (SOP) based on national guidelines would ensure uniformity in the management of GDM hospitals/clinics
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
12. Proper documentation of initial screening, diagnosis, treatment plans, antenatal care, post natal care, follow up, evaluation etc. of GDM should be done at hospitals/clinics for continuous improvement purposes
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
13. Continuous training of all health care professionals involved in the management of GDM is necessary for maintaining the standard of care
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
14. Interdisciplinary rounds, clinical audits, etc. ensures that the treatment of GDM cases is done without any pitfalls.
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
---	--------------------------------	----------------------------------	-----------------------------------	-------------------------------------
15. In your opinion is it possible for most GDM women to achieve normoglycaemia by following proper MNT and exercise during pregnancy?
 

<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Neutral	<input type="checkbox"/> Disagree	<input type="checkbox"/> Don't know
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16. Do you think a protocol based flow chart can be helpful in doing biochemical tests for GDM women?  
 Strongly Agree     Agree    Neutral     Disagree     Don't know
17. On an average how many pregnant women with gestational diabetes mellitus (GDM) comes for treatment in your Institution in ONE MONTH?  
 0-5     6-10     11-15     >15
18. Are there any operating guidelines/ recommendations used as a reference in the management of GDM in your institution?  
 Yes    No    Don't know    If yes, specify \_\_\_\_\_
19. Is Single Step Glucose Test using 75g oral glucose and measuring blood glucose 2 hrs after ingestion done as the usual diagnostic test for GDM at your institution?  
 Yes    No    Others (specify) \_\_\_\_\_
20. Is the OGTT in a fasting or non-fasting state?  
 Fasting     Non-fasting
21. Type of blood sample used for OGTT (please tick one)  
 Venous     Capillary     Not sure
22. Which blood samples are drawn during the OGTT? (Please tick all that apply)  
 0h    1h    2h    3h    Others (please specify)
23. Which criteria is used to diagnose GDM in your institution? \_\_\_\_\_
24. Is your institution recognised for quality of care under any national or international accreditation agency/organization?  
 Yes    No   If Yes, please specify \_\_\_\_\_
25. Can you elaborate on how the quality control practices/protocols are planned for GDM women in your practice? (steps/procedures involved from admission to discharge of GDM women)
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

## APPENDIX V

### Bilingual Consent Form Page 1

#### INFORMED CONSENT FORM FOR PREGNANT WOMEN PARTICIPATING IN RESEARCH STUDY

**Ms. Sindhu S**

**Ph. D. (Part time) Scholar, Avinashilingam Deemed Univesity, Coimbatore, Tamil Nadu.**

**Research Title** - Development and Evaluation of a Sustainable Standard Operating Protocol for GDM Women for Improved Medical Nutrition Therapy and Maternal Foetal Outcomes.

**This Informed Consent Form has two parts:**

**Information Sheet (to share information about the study with you)**

**Certificate of Consent (for signatures if you choose to participate)**

**You will be given a copy of the full Informed Consent Form (ICF)**

#### **Part I: Information Sheet**

I am Sindhu S. undergoing Ph.D. (Part time ) at Avinashilingam Deemed University, Coimbatore on Gestational Diabetes Mellitus which is now progressing to be very common in our country. I am going to give you information and invite you to be part of this research. The purpose of this research is to find out the current practices followed for the treatment of gestational diabetes and also find ways to improve the practices. This research will involve your participation in a 20-40 mins interview schedule. You are being invited to take part in this research as your experience can contribute much towards understanding and knowing GDM. Your participation in this research is entirely voluntary. If you choose not to participate all services you receive at this Centre will continue and nothing will change.

If you accept to participate in this research you will be asked questions to collect information pertaining to your past and present medical history, behavioural, lifestyle and nutritional patterns to know more about the condition. The information provided by you will be kept confidential and no one else other than me and my guide will have access to it. No data will be shared to anyone outside of the research team. The data collected will not be used for anything else other than for the intended purpose.

The research takes place over 4 years in total. During that period, you will be interviewed by me at the time of your visits to the doctor. You do not have to answer any question if you feel the question(s) are too personal or if talking about them makes you uncomfortable. There will not be any monetary benefit or incentive provided to you as part of taking part in the research. But, awareness on proper and effective nutritional management of GDM and prevention of future Diabetes Mellitus will be provided to you.

The research findings will be shared more broadly, that is through publications and conferences. You may stop participating in the interview at any time that you wish. I will give you an opportunity at the end of the interview to review your remarks, modify or remove portions of those, if you do not agree with my notes or if I did not understand you correctly. If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact any of the following: Sindhu S., Mobile No. 9895 63 6419, [sindhus16@gmail.com](mailto:sindhus16@gmail.com), Dr. S. Uma Mageshwari, Mobile No. 9787 73 3663, [uma.adu3@gmail.com](mailto:uma.adu3@gmail.com) This proposal has been reviewed and approved by the Management of Renai medicity, Kochi to make sure that research participants are protected from harm. To find about more about the study please contact the office of Director, Renai Medicity, Palarivattom, Kochi

#### **Part II: Certificate of Consent**

I have read the above information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of Participant \_\_\_\_\_ Signature of Participant \_\_\_\_\_ Date \_\_\_\_\_

#### **Statement by the researcher taking consent**

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the following:

1. Purpose of the research, Type of intervention, Voluntary participation, Duration of research
  2. Procedure of data collection, Interpretation of results of the research
  3. Confidentiality of data, Right of participants to refuse or withdraw, whom to contact for further details
- I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this ICF has been provided to the participant.

Name of Researcher \_\_\_\_\_ Signature of Researcher \_\_\_\_\_ Date \_\_\_\_\_

APPENDIX V

Bilingual Consent Form Page 2

ഗവേഷണത്തിൽ പങ്കെടുക്കുന്ന ഗർഭിണിയായ സ്ത്രീകൾക്കായുള്ള സമ്മതപത്രം

സിന്ധു എസ്. പി എച്ച് ഡി (പാർട്ട് ടൈം) ഗവേഷക. അവിനാശിലിംഗം ഡീപ് യൂണിവേഴ്സിറ്റി, കോയമ്പത്തൂർ, തമിഴ്നാട്

ഗവേഷണ വിഷയം: ഡെവലപ്മെന്റ് ആൻഡ് ഇവാലുവേഷൻ ഓഫ് എ എസ് എസ് ഒ പി (സസ്റ്റൈൻ നബിൾ സ്റ്റാൻഡേർഡ് ഓപറേറ്റിങ്ങ് പ്രോട്ടോക്കോൾ) ഫോർ ജെൻറേഷണൽ ഡയബറ്റീസ് മെലിറ്റസ് വിമൻ ഫോർ ഇംപ്രൂവ്ഡ് എം എൻ റ്റി (മെഡിക്കൽ ന്യൂട്രീഷൻ റെറ്റാപ്പി) ആൻഡ് മെറ്റേണൽ ഫീറ്റൽ ഔട്കം.

ഈ സമ്മതപത്രത്തിന് രണ്ടു ഭാഗങ്ങളുണ്ട്:

ഇൻഫർമേഷൻ ഷീറ്റ് (പഠനത്തെ സംബന്ധിക്കുന്ന വിവരങ്ങൾ താങ്കളുമായി പങ്കു വെയ്ക്കുവാൻ സർട്ടിഫിക്കറ്റ് ഓഫ് കൺസന്റ് (താങ്കൾ പങ്കെടുക്കുവാൻ തയ്യാറായാൽ ഒപ്പ് വാങ്ങുവാനായി). സമ്മതപത്രത്തിന്റെ ഒരു പകർപ്പ് താങ്കൾക്കു നൽകുന്നതാണ്)

ഭാഗം 1: ഇൻഫർമേഷൻ ഷീറ്റ്

ഞാൻ സിന്ധു എസ്. കോയമ്പത്തൂർ അവിനാശിലിംഗം യൂണിവേഴ്സിറ്റിയിൽ ജന്യേഷണൽ ഡയബറ്റീസ് മെലിറ്റസിനെ പറ്റി ഗവേഷണത്തിൽ ഏർപ്പെട്ടിട്ടുള്ള പി എച്ച് ഡി (പാർട്ട് ടൈം) ഗവേഷകയാണ്. നമ്മുടെ രാജ്യത്ത് സാധാരണയായി കണ്ടു വരുന്ന ഒന്നാണ് ജന്യേഷണൽ ഡയബറ്റീസ് മെലിറ്റസ്. ഞാൻ താങ്കൾക്ക് ഇതു സംബന്ധിക്കുന്ന വിവരങ്ങൾ നൽകുകയും താങ്കളെ ഈ ഗവേഷണത്തിന്റെ ഭാഗമാകുവാൻ ക്ഷണിക്കുകയും ചെയ്യുകയാണ്. ജന്യേഷണൽ ഡയബറ്റീസ് മെലിറ്റസിന്റെ ചികിത്സയ്ക്കായി നിലവിൽ ഉപയോഗിക്കുന്ന മാർഗ്ഗങ്ങളെ അവലോകനം ചെയ്യുകയും നൂതനരീതികൾ കണ്ടെത്തുവാൻ ശ്രമിക്കുകയും ചെയ്യുക എന്നതാണ് ഈ ഗവേഷണത്തിന്റെ ഉദ്ദേശം. 20 - 20 മിനിറ്റ് നീളുന്ന ഇന്റർവ്യൂയിലൂടെയും താങ്കളെ ഈ ഗവേഷണത്തിന്റെ ഭാഗമാക്കുക. താങ്കളുടെ അനുഭവസമ്പത്ത് ഈ പഠനത്തിന് ഏറെ സഹായകമാകും എന്നതിനാലാണ് താങ്കളെ ഇതിലേക്ക് സാഗതം ചെയ്യുന്നത്. താങ്കളുടെ പൂർണ്ണ സമ്മതപ്രകാരം മാത്രം ഈ ഗവേഷണത്തിൽ പങ്കെടുത്താൽ മതി. അഥവാ താങ്കൾ പങ്കെടുക്കുവാൻ താൽപര്യപ്പെടുന്നില്ലായെങ്കിലും ഈ സെന്ററിൽ നിന്നും താങ്കൾക്ക് ലഭിക്കുന്ന സേവനങ്ങൾക്ക് ഒരു തടസ്സവും ഉണ്ടാകുന്നതല്ല.

താങ്കൾ ഈ ഗവേഷണത്തിൽ പങ്കെടുക്കുവാൻ സന്നദ്ധത കാണിക്കുകയാണെങ്കിൽ താങ്കളുടെ നിലവിലെയും മുൻകാലങ്ങളിലെയും ആരോഗ്യസ്ഥിതി, ജീവിതരീതി, ന്യൂട്രീഷണൽ ക്രമം തുടങ്ങിയവയെ സംബന്ധിക്കുന്ന വിവരങ്ങൾ ശേഖരിക്കുന്നതാണ്. ഇത്തരം ഏല്പാ വിവരങ്ങളും ഞാനോ എന്റെ ഗൈഡോ അല്ലാതെ മറ്റൊരാളും കാണുന്നതല്ല. ആർക്കും കൈമാറ്റം ചെയ്യുന്നതുമല്ല. റിസർച്ച് ടീമിന് വെളിച്ചില്ലാത്ത ആരുമായും ഇതു പങ്കു വെയ്ക്കുന്നതല്ല. ഗവേഷണത്തിന്റെ ആവശ്യത്തിനല്ലാതെ മറ്റൊരു കാര്യത്തിനും ഈ വിവരങ്ങൾ ഉപയോഗിക്കുന്നതല്ല. നാല് വർഷങ്ങൾ നീണ്ടു നിൽക്കുന്ന ഗവേഷണമാണ് ഇത്. ഇക്കാര്യങ്ങളിൽ ഡോക്ടറെ കാണാൻ വരുമ്പോൾ താങ്കളോട് ഞാൻ ചോദ്യങ്ങൾ ചോദിക്കുന്നതാണ്. ചോദ്യങ്ങൾക്ക് ഉത്തരം പറയാൻ താങ്കൾക്ക് താൽപര്യമില്ല എന്നുണ്ടെങ്കിൽ താങ്കളെ നിർബന്ധിക്കുന്നതല്ല. സാമ്പത്തികമായ യാതൊരു നേട്ടവും ഈ ഗവേഷണത്തിൽ പങ്കെടുക്കുന്നതു വഴി താങ്കൾക്കു ലഭിക്കുന്നതല്ല. എന്നാൽ ജന്യേഷണൽ ഡയബറ്റീസ് മെലിറ്റസിനുള്ള കൃത്യമായ ന്യൂട്രീഷണൽ മാനേജ്മെന്റിനെ സംബന്ധിക്കുന്ന ബോധവൽക്കരണവും പ്രതിരോധമാർഗ്ഗങ്ങളെ പറ്റിയുള്ള വിവരങ്ങളും താങ്കൾക്ക് നൽകുന്നതാണ്.

ഗവേഷണത്തിൽ നിന്നും ഉരുത്തിരിയുന്ന കണ്ടെത്തലുകൾ വിശദമായി ഗവേഷണപ്രസിദ്ധീകരണങ്ങളിലോ കോൺഫറൻസുകളിലോ കൈ പരസ്യമാക്കുന്നതാണ്. ഏതു സമയവും അഭിമുഖത്തിൽ നിന്നും താങ്കൾക്കു പിൻമാറാവുന്നതാണ്. അഭിമുഖത്തിനൊടുവിൽ താങ്കൾ പങ്കു വെച്ച കാര്യങ്ങൾ പരിശോധിക്കുവാൻ താങ്കൾക്ക് അവസരമുണ്ടായിരിക്കും. എന്റെ കുറിച്ചുള്ളതുമായി താങ്കൾക്ക് യോജിപ്പില്ലെങ്കിലോ എനിക്ക് താങ്കൾ പറഞ്ഞത് കൃത്യമായി മനസ്സിലായില്ല എന്നു തോന്നുകയോ ചെയ്താൽ ആ ഭാഗങ്ങൾ മാറ്റി എഴുതുവാനോ നിങ്ങൾ ചെയ്യുവാനോ ഈ അവസരം ഉപയോഗിക്കാം. താങ്കൾക്ക് എന്തെങ്കിലും സംശയമുണ്ടെങ്കിൽ ഇപ്പോൾ അല്ലെങ്കിൽ എപ്പോൾ വേണമെങ്കിലും ചോദിക്കാം. സംശയങ്ങൾക്കായി ഈ നമ്പരുകളിൽ വിളിക്കുകയോ ഇ മെയിൽ വഴി ബന്ധപ്പെടുകയോ ചെയ്യാം:

സിന്ധു എസ്. മൊബൈൽ: 989563649, [sindhus16@gmail.com](mailto:sindhus16@gmail.com), ഡോ. എസ്. ഉമ മഹേശരി. മൊബൈൽ: 9787733663, [uma.adu3@gmail.com](mailto:uma.adu3@gmail.com) ഈ പ്രൊപ്പോസലിന് റീനയ് ആശുപത്രിയുടെ മാനേജ്മെന്റിന്റെ അംഗീകാരം ലഭിച്ചിട്ടുണ്ട്. ഗവേഷണത്തിൽ പങ്കെടുക്കുന്നവർക്ക് കൃഷ്ണങ്ങളൊന്നും സംഭവിക്കുന്നില്ല എന്ന് ഉറപ്പാക്കുവാൻ വേണ്ടിയാണിത്. ഈ പഠനത്തെ സംബന്ധിക്കുന്ന കൂടുതൽ വിവരങ്ങൾ അറിയുവാൻ ഈ ഓഫീസുമായി ബന്ധപ്പെടാവുന്നതാണ്. ഡയറക്ടർ, റീനയ് മെഡിസിറ്റി, എറണാകുളം.

ഭാഗം 2: സർട്ടിഫിക്കറ്റ് ഓഫ് കൺസന്റ്

മുകളിൽ പറഞ്ഞിരിക്കുന്ന വിവരങ്ങൾ ഞാൻ വായിക്കുകയോ എനിക്കു വായിച്ചു നൽകുകയോ ചെയ്തിട്ടുണ്ട്. ഇതിനെ സംബന്ധിക്കുന്ന ചോദ്യങ്ങൾ ചോദിക്കുവാൻ എനിക്ക് അവസരം ലഭിക്കുകയും ചോദിച്ചിട്ടുണ്ടെങ്കിൽ അതിന് തൃപ്തികരമായ മറുപടി ലഭിക്കുകയും ചെയ്തിട്ടുണ്ട്. ഞാൻ സ്വന്തം ഇഷ്ടപ്രകാരം ഈ പഠനത്തിന്റെ ഭാഗമാകുവാൻ താൽപര്യപ്പെടുന്നു.

പങ്കെടുക്കുന്നയാളുടെ പേര് \_\_\_\_\_ പങ്കെടുക്കുന്നയാളുടെ ഒപ്പ് \_\_\_\_\_ തീയതി: \_\_\_\_\_  
സമ്മതം സീകരിക്കുന്ന ഗവേഷണം നടത്തുന്ന വ്യക്തിയുടെ പ്രസ്താവന  
ഗവേഷണത്തിൽ പങ്കെടുത്തേക്കുവാൻ സാധ്യതയുള്ള വ്യക്തിക്ക് ഞാൻ ഇൻഫർമേഷൻ ഷീറ്റ് കൃത്യമായി വായിച്ചു കേൾപ്പിക്കുകയും എന്റെ കഴിവിന്റെ പരമാവധി ഉപയോഗിച്ച് തുടർന്നുള്ള കാര്യങ്ങൾ മനസ്സിലാക്കുവാൻ സഹായിക്കുകയും ചെയ്തിട്ടുള്ളതാണ്.

- 1. ഗവേഷണത്തിന്റെ ഉദ്ദേശം, ഇടപെടലിന്റെ രീതി, സമ്പത്തപ്രകാരമുള്ള പങ്കാളിത്തം, ഗവേഷണത്തിന്റെ കാലയളവ്.
  - 2. വിവരങ്ങൾ ശേഖരിക്കുന്ന പ്രക്രിയ, കണ്ടെത്തലുകളുടെ വ്യാപനം
  - 3. വിവരങ്ങളുടെ രഹസ്യസ്വഭാവം, പങ്കെടുക്കുന്നവർക്ക് നിഷേധിക്കുവാനോ പിൻവാങ്ങുവാനോ ഉള്ള അവകാശം, ബന്ധപ്പെടേണ്ടവരുടെ വിവരങ്ങൾ
- പങ്കെടുക്കുന്ന വ്യക്തിക്ക് ചോദ്യം ചോദിക്കുവാനുള്ള അവസരം നൽകുകയും അത്തരം ചോദ്യങ്ങൾക്ക് എന്റെ കഴിവിന്റെ പരമാവധി ഉപയോഗിച്ച് ഉത്തരങ്ങൾ നൽകുകയും ചെയ്തിട്ടുള്ളതാണ് എന്നു ഞാൻ ഇതിനാൽ സാക്ഷ്യപ്പെടുത്തുന്നു. പങ്കെടുക്കുന്ന വ്യക്തിയെ നിർബന്ധിച്ച് ചേർത്തതല്ല എന്നും സമ്മതസ്ഥാലേ ഇതിന്റെ ഭാഗമാകുവാൻ സമ്മതിച്ചതാണെന്നും സാക്ഷ്യപ്പെടുത്തുന്നു.
- ഈ സമ്മതപത്രത്തിന്റെ ഒരു പകർപ്പ് പങ്കെടുക്കുന്ന വ്യക്തിക്കും നൽകിയിട്ടുണ്ട്.

ഗവേഷകയുടെ പേര് \_\_\_\_\_ ഗവേഷകയുടെ ഒപ്പ് \_\_\_\_\_ തീയതി \_\_\_\_\_

**APPENDIX VI**

**Interview Schedule used for eliciting Current Practices and Management of GDM received by Pregnant Women**

**GESTATIONAL DIABETES MELLITUS – AN INTERVIEW SCHEDULE FOR GDM WOMEN**

**Demographic Details**

Name of Patient: \_\_\_\_\_ Date of Birth: \_\_\_\_\_ Age: \_\_\_\_\_ Hospital \_\_\_\_\_

No: \_\_\_\_\_

Name of Doctor: \_\_\_\_\_ Name of Hospital/Centre: \_\_\_\_\_ Patient’s Mobile No: \_\_\_\_\_

What is the highest degree/ level of education you have completed?

Occupation: \_\_\_\_\_

Status of pregnancy: \_\_\_\_\_ (week/month) of gestation

**Risk factors for GDM**

Diabetes Mellitus	<input type="checkbox"/> Yes <input type="checkbox"/> No
Previous history of GDM	<input type="checkbox"/> Yes <input type="checkbox"/> No
Family history of Diabetes	<input type="checkbox"/> Yes <input type="checkbox"/> No
History of PCOS	<input type="checkbox"/> Yes <input type="checkbox"/> No
History of hypothyroidism	<input type="checkbox"/> Yes <input type="checkbox"/> No
History of still birth/macrosomia	<input type="checkbox"/> Yes <input type="checkbox"/> No

**Understanding the Consequences of GDM**

Are you aware of the impact that diabetes has on pregnancy and the baby? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is this pregnancy planned or unplanned one? <input type="checkbox"/> Planned <input type="checkbox"/> Unplanned

**Perceptions towards Managing Pregnancy**

On a scale of 0 to 10, how important is it to you to make changes needed to manage your gestational diabetes? Please circle the number.  not important at all 0 1 2 3 4 5 6 7 8 9 10 very important
On a scale of 0 to 10, how confident are you that you can make these changes? Please circle the number.  not confident at all 0 1 2 3 4 5 6 7 8 9 10 very confident

**MNT Practices**

Do you have a meal plan for yourself? <input type="checkbox"/> No <input type="checkbox"/> Yes If yes, what? (Check all that apply) <input type="checkbox"/> Self made <input type="checkbox"/> Prescribed by Dietitian of the treating hospital <input type="checkbox"/> Prescribed by Dietitian (outside) <input type="checkbox"/> Treating Doctor <input type="checkbox"/> No added sugar diet plan only is followed <input type="checkbox"/> Others _____
--

**Dietary Intake**

	TIME	TYPICAL MEALS – Example of one typical day and include amounts
Early morning		
Breakfast		
Morning snack		
Lunch		
Afternoon snack		
Evening snack		

Dinner		
Bedtime snack		
<b>Physical Activity Patterns</b>		
Do you exercise? <input type="checkbox"/> No <input type="checkbox"/> Yes If No, reason _____		
If yes, what types? <input type="checkbox"/> Walking <input type="checkbox"/> Walking on Treadmill <input type="checkbox"/> Jogging <input type="checkbox"/> Cycling <input type="checkbox"/> Swimming <input type="checkbox"/> Breathing exercises only <input type="checkbox"/> Others _____		
_____		
How many times per week do you exercise? <input type="checkbox"/> 0 <input type="checkbox"/> 1-2 <input type="checkbox"/> 3-4 <input type="checkbox"/> 5-6 <input type="checkbox"/> more than 6		For how many minutes per time? <input type="checkbox"/> 0 <input type="checkbox"/> 1-10 <input type="checkbox"/> 11-15 <input type="checkbox"/> 16-30 <input type="checkbox"/> more than 30
Have you been advised by a physician to limit your exercise during pregnancy? <input type="checkbox"/> No <input type="checkbox"/> Yes If yes, please explain _____		
_____		
When not at work, how many hours a day are you inactive? (TV, computer, reading, etc.) <input type="checkbox"/> 0 <input type="checkbox"/> 1-2 <input type="checkbox"/> 3-4 <input type="checkbox"/> 5-6 <input type="checkbox"/> more than 6		
What is your height?	What was your weight before this pregnancy?	What is your current weight?
Do you have any other nutrition concerns a. Diet controlling to maintain Blood glucose b. Loss of Appetite c. Uncontrolled Hunger d. Not able to eat adequate quantity and quality in diet e. Others _____		

**GDM Management and MNT Practices received**

Did you receive diet consultation from the dietitian in the hospital?

Yes  No If Yes, at what stage did you receive? \_\_\_\_\_

For controlling blood glucose were you advised diet and exercise first?

Yes  No If No, what was advised? \_\_\_\_\_

If diet was advised for long was it advised? \_\_\_\_\_

If medication was advised when was it started? \_\_\_\_\_

Lab details of screening of GDM																	
Screening	Date	GA (weeks)	Fasting Glucose (mg/dl)		1 hr post glucose (mg/dl)		2 hrs post glucose (mg/dl)		Non-fasting glucose (mg/dl)		1 hr post glucose (mg/dl)		2 hrs post glucose (mg/dl)		Hb A1c (%)	Hb gm %	TSH (mIU /)
			venous	capillary	venous	capillary	venous	capillary	venous	capillary	venous	capillary	venous	capillary			
First Screening																	
Repeat Screening																	

**Clinical Follow Up**

Management Details							Comments
Follow up visits							
Medical Nutrition Therapy (MNT)							
Physical activity							
Weight gain (kg)							
Insulin treatment *							
Metformin #							
FBS (mg/dl)							
PPBS (mg/dl)							
HbA1c (%)							
Hb (gm%)							

Ultrasonogram Details								Comments
Gestational weeks	Date	GA	CRL (mm)	BPD (mm)	HC (mm)	AC (mm)	FL (mm)	

Delivery Details					Comments
Date of Delivery					
Maternal weight before delivery (kg)					
Total weight gain (kg)					
Gestational age at delivery (weeks)					
Labour	Spontaneous <input type="checkbox"/>		Induced <input type="checkbox"/>		
Mode of Delivery	Spontaneous <input type="checkbox"/>	Instrumental <input type="checkbox"/>	LSCS – elective <input type="checkbox"/>	LSCS – emergency <input type="checkbox"/>	
Birth Outcome	Term live birth <input type="checkbox"/>	Pre term live birth <input type="checkbox"/>	Abortion <input type="checkbox"/>	Still birth <input type="checkbox"/>	
Birth weight of baby (kg)					
Apgar score ( <i>specify the score in the box</i> )	1 min <input type="checkbox"/>		5 min <input type="checkbox"/>		
Fetopelvic	Yes		No		

---

<b>disproportion</b>			
<b>Perineal trauma</b>	Yes	No	
<b>Preeclampsia</b>	Yes	No	
<b>Shoulder dystocia</b>	Yes	No	
<b>Birth injury for baby</b>	Yes	No	
<b>Congenital malformation</b>	Yes	No	
<b>Neonatal hypoglycaemia</b>	Yes	No	
<b>Admission to NICU</b>	Yes	No	
<b>Polycythemia</b>	Yes	No	
<b>Hyperbilirubinemia</b>	Yes	No	
<b>Any other significant outcome observed ( if yes, please specify)</b>	Yes	No	

## APPENDIX VII

## Sustainable Standard Operating Protocol for Medical Nutrition Therapy for Gestational Diabetes Mellitus

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Prepared By

Reviewed By

Approved By

Sindhu S.  
Regd. Dietitian & PhD Scholar,  
Avinashilingam Institute for Home  
Science and Higher Education for  
Women, Coimbatore.

Swapna I.  
Regd. Dietitian & Deputy Manager,  
Dept. of Nutrition and Dietetics,  
Renai Medicity,  
Kochi.

Dr. Sophia Jaleel  
Manager,  
Quality and Patient Safety,  
Renai Medicity  
Kochi

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**STANDARD OPERATING PROCEDURES FOR MEDICAL NUTRITION THERAPY FOR GESTATIONAL DIABETES MELLITUS WOMEN**

**1. PURPOSE**

1.1 To provide a guideline-based medical nutrition therapy for all pregnant women visiting the hospital.

1.2 To provide systematic and consistent medical nutrition therapy for all pregnant women for prevention of gestational diabetes mellitus and improved maternal and foetal outcomes.

**2. SCOPE**

2.1 To help in early identification of pregnant women at risk of developing gestational diabetes mellitus.

2.2 To simplify estimation of nutrient requirements and analysis of gestational weight gain pattern among pregnant women.

**3. RESPONSIBILITY**

3.1 Dietitians

3.2 Nursing Aids (ObGyn OPD), Nurses (ObGyn)

3.3 Obstetricians/ Gynaecologists

3.4 Diabetologists/Endocrinologists

**4. PROCEDURE (OUT PATIENT)**

**4.1 Initial screening and assessment**

4.1.1 After patient registration is completed, all pregnant women shall undergo GDM risk screening at the Screening room

4.1.2 The Nursing Aid enters the registration details and other mandatory fields in the Mobile App/GDM risk screening form (Annexure 7.1) and directs all pregnant women to the doctor's outpatient unit in the department of obstetrics and gynecology.

4.1.3 After doctor's consultation all pregnant women would be directed to the dietitian's outpatient clinic by the Nursing Aid for further nutrition assessment

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4.1.4 The dietitian further assesses the GDM risk for the pregnant women and all identified GDM High Risk pregnant women will be noted as “GDM High Risk”, GDM Average Risk pregnant women as “GDM Average Risk” and GDM Low Risk pregnant women as “GDM Low Risk”.

**4.2 Nutrition assessment**

4.2.1 The dietitian conducts the nutrition assessment of all pregnant women based on anthropometric, biochemical, clinical and dietary data to determine the nutrition intervention using the Mobile App or manually.

4.2.2 The anthropometric measurements include height, pre-pregnancy weight, current weight, body mass index (BMI), expected gestational weight gain.

4.2.3 Biochemical parameters include like blood glucose tests, haemoglobin, TSH, etc.

4.2.4 Clinical data include family history of Type 2 DM, past history of PCOS and hypothyroidism, previous history of GDM or impaired glucose tolerance and previous pregnancy outcomes.

4.2.5 Dietary data includes patient’s likes and dislikes, diet patterns and a 24 hour dietary recall to assess the overall nutrient intake of the patient.

**4.3 Nutrition diagnosis**

4.3.1 A PES (problem-etiology-signs and symptoms) statement will be derived by the dietitian to arrive at the nutrition problem which needs to be resolved through nutrition intervention.




**4.4 Nutrition intervention**

Based on the nutrition diagnosis and nutrition assessment, nutrition intervention would be prescribed by the dietitian as follows.

Note: (Annexure 7.2) provides details on how pre-pregnancy BMI, total gestational weight gain needed, expected gestational weight gain, nutrient requirements based on pre-pregnancy BMI and gestation period are calculated)

**4.4.1 For GDM High Risk Women (Nutrition Intervention 1)**

4.4.1.1 Plan, calculate and prescribe a customised diet plan based on pre-pregnancy BMI, ideal body weight and expected gestational weight gain and provide diet counselling (Annexure 7.3) for a duration of 20 minutes at first antenatal visit; followed by monthly MNT review with diet counselling sessions of 20 minutes duration.

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4.4.1.2 Recommend physical activity in the form of walking for 30 minutes three to five times per week based on patient's fitness for doing the prescribed physical activity after evaluation by the treating doctor.

4.4.1.3 Plan, calculate and modify the customised diet plan in second and third trimester as per the increment in energy and protein requirements for pregnancy

4.4.1.4 Provide diet counselling along with an e-booklet on lactation and complementary feeding after delivery.

**4.4.2 For GDM Average Risk Women (Nutrition Intervention 2)**

4.4.2.1 Provide diet counselling (Annexure 7.3) of 20 minutes duration once every trimester without a customised diet plan.

4.4.2.2 Recommend physical activity in the form of walking for 30 minutes three to five times per week based on patient's fitness for doing the prescribed physical activity after evaluation by the treating doctor.

4.4.2.3 Provide diet counselling along with an e-booklet on lactation and complementary feeding after delivery.

**4.4.3 For GDM Low Risk Women (Nutrition Intervention 3)**

4.4.3.1 Provide diet counselling (Annexure 7.3) of 20 minutes at first antenatal visit only without a customised diet plan.

4.4.3.2 Provide diet counselling along with an e-booklet on lactation and complementary feeding after delivery.

4.4.3.3 The dietitian records a brief note of the nutrition intervention plan and review visit needed for each category of pregnant women in the EMR and the App.

4.4.3.4 Apart from diet counselling, nutrition awareness sessions online or direct (on topics such as nutrition in pregnancy, gestational weight gain pattern, exercise during pregnancy, prevention of gestational diabetes mellitus, importance of blood glucose maintenance etc.) will be conducted for all pregnant women visiting the hospital on every second and fourth Saturday of every month.

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**4.5 Nutrition monitoring and evaluation**

4.5.1 Dietitian review visit for monitoring and evaluation will be mandatory for all GDM High Risk women every month. Dietitian review visit will be once every trimester for GDM Average Risk women and no review visits will be planned for GDM Low Risk women.

4.5.2 Nutrition evaluation comprising maternal and foetal outcomes among pregnant women, adequacy of total gestational weight gain at delivery, detection of GDM among all pregnant women and effect of nutrition intervention on maternal and foetal outcomes was done for all GDM risk groups.

**5. PROCEDURE (IN PATIENT)**

**5.1 Initial screening and nutrition assessment**

5.1.1 All pregnant women admitted in the hospital shall be screened for GDM risk using the App/GDM risk screening form (Annexure 7.1) by the Dietitian within 24hours of IP admission.

5.1.2 All identified GDM High Risk pregnant women will be noted as “GDM High Risk”, GDM Average Risk pregnant women as “GDM Average Risk” and GDM Low Risk pregnant women as “GDM Low Risk” in the Nutrition Assessment form.

5.1.3 The dietitian conducts nutrition assessment of all pregnant women based on anthropometric, biochemical, clinical and dietary data to determine the nutrition intervention using the Mobile App or manually.

5.1.4 The anthropometric measurements include height, pre-pregnancy weight, current weight, body mass index (BMI), expected gestational weight gain

5.1.5 Biochemical parameters include like blood glucose tests, haemoglobin, TSH,

5.1.6 Clinical data include family history of Type 2 DM, past history of PCOS and hypothyroidism, previous history of GDM or impaired glucose tolerance and previous pregnancy outcomes.

5.1.7 Dietary data includes patient’s likes and dislikes, diet patterns and a 24 hour dietary recall to assess the overall nutrient intake of the patient.

**5.2 Nutrition diagnosis**

5.2.1 A PES (problem-etiology-signs and symptoms) statement will be derived to arrive at the nutrition problem which needs to be resolved through nutrition intervention. The PES statement (if derived) will be written in Nutrition Assessment form.

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**5.3 Nutrition intervention**

Based on the nutrition diagnosis and nutrition assessment, nutrition intervention would be prescribed by the dietitian as follows

Note: Annexure 7.2 provides details on how pre-pregnancy BMI, total gestational weight gain needed, expected gestational weight gain, nutrient requirements based on pre-pregnancy BMI and gestation period are calculated.

**5.3.1 For GDM High Risk Women (Nutrition Intervention 1)**

5.3.1.1 Plan, calculate and prescribe a customized diet plan based on pre-pregnancy BMI, ideal body weight and expected gestational weight gain and provide diet counselling (Annexure 7.3) for a duration of 20 minutes; followed by monthly MNT review at OPD with diet counselling sessions of 20 minutes duration.

5.3.1.2 Recommend physical activity in the form of walking for 30 minutes three to five times per week based on patient's fitness for doing the prescribed physical activity after evaluation by the treating doctor.

5.3.1.3 Plan, calculate and modify the customised diet plan in second and third trimester as per the increment in energy and protein requirements for pregnancy

5.3.1.4 Provide diet counselling along with an e-booklet on lactation and complementary feeding after delivery.

**5.3.2 For GDM Average Risk Women (Nutrition Intervention 2)**




5.3.2.1 Provide diet counselling (Annexure 7.3) of 20 minutes duration without a customised diet plan followed by a MNT review at OPD with diet counselling sessions of 20 minutes duration every trimester.

5.3.2.2 Recommend physical activity in the form of walking for 30 minutes three to five times per week based on patient's fitness for doing the prescribed physical activity after evaluation by the treating doctor.

5.3.2.3 Provide diet counselling along with an e-booklet on lactation and complementary feeding after delivery.

**5.3.3 For GDM Low Risk Women (Nutrition Intervention 3)**

5.3.3.1 Provide diet counselling (Annexure 7.3) of 20 minutes without a customised diet plan or any MNT review at OPD.

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5.3.3.2 Provide diet counselling along with an e-booklet on lactation and complementary feeding after delivery.

5.3.3.3 The dietitian records a brief note of the nutrition intervention plan and review visit needed for the pregnant women in the Nutrition assessment form and the App.

**5.4 Nutrition monitoring and evaluation**

5.4.1 Dietitian review visit for monitoring and evaluation will be mandatory for all GDM High Risk pregnant women every month at Dietitian’s OPD and once in every trimester for GDM Average risk women and no review visits will be planned for GDM Low Risk women.

5.4.2 Apart from diet counselling, nutrition awareness sessions online or direct (on topics such as nutrition in pregnancy, gestational weight gain pattern, exercise during pregnancy, prevention of gestational diabetes mellitus , importance of blood glucose maintenance etc.) will be conducted for all pregnant women visiting the hospital on every second and fourth Saturday of every month.

5.4.3 Nutrition evaluation comprising maternal and foetal outcomes among pregnant women, adequacy of total gestational weight gain at delivery, detection of GDM among all pregnant women and effect of nutrition intervention on maternal and foetal outcomes will be done for all GDM risk groups.

**Note:** Although intense nutritional intervention is planned for GDM high risk women, any pregnant women diagnosed with GDM at any time of the gestational period will be provided the same nutrition intervention as was done for the GDM high risk women.

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**7. Annexures**

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**Annexure 7.1  
GDM SCREENING FORM**

Name of Patient: \_\_\_\_\_ Age: \_\_\_\_\_ Hospital No: \_\_\_\_\_  
 Phone number: \_\_\_\_\_ Email Id: \_\_\_\_\_  
 Education: \_\_\_\_\_ Employment: \_\_\_\_\_  
 Activity level: \_\_\_\_\_  
 Current Period of gestation (weeks) (months)  
 Height (cm) (feet) (inches)  
 Pre pregnancy Weight (kg) Current Weight (kg)

**GDM Risk Screening**

1. Age above 25 years Yes No
2. BMI  $\geq 25 \text{kg/m}^2$  Yes No
3. Family History of Diabetes Yes No  
     - If Yes,  Father  Mother
4. Previous History of GDM Yes No
6. Previous History of still birth or a very large baby Yes No
7. Previous History of impaired glucose tolerance Yes No
8. Previous History of PCOS/Hypothyroidism Yes No

**High risk: Yes to two or more questions**

**Average Risk: Yes to only one question**

**Low Risk: No to all questions**

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Screening done by \_\_\_\_\_

Signature \_\_\_\_\_

Source: "Am I at risk for gestational diabetes?" of Eunice Kennedy Shriver National Institute of Child Health and Human Development, US Department of Health and Human Services, National Institutes of Health, 2012

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Annexure 7.2

Calculation of Components of Medical Nutrition Therapy

i. Assessment of body mass index (BMI) based on pre pregnancy weight

Using the pre-pregnancy weight and height of pregnant women, BMI calculation and categorization done using the Asian BMI Classification, WHO, 2002 as follows.

BMI =  $\frac{\text{Pre-pregnancy weight (kg)}}{(\text{Height in metre})^2}$

Nutrition status	BMI (kg/m <sup>2</sup> )
Underweight	<18.5
Normal	18.5 – 22.9
Overweight	23 – 24.9
Obese I	25 – 29.9
Obese II	>30

ii. Estimation of required total gestational weight gain

Based on the calculated pre-pregnancy BMI, required total weight gain recommendation can be derived from the Gestational Weight Recommendations, Institute of Medicine as follows.

Pre-pregnancy BMI category (kg/m <sup>2</sup> )	Total weight gain (kg)
Underweight	12.5 – 18
Normal	11.5 – 16
Overweight	7 – 11.5
Obese I & II	5 – 9

iii. Expected Weight for current period of gestation

Based on the category of pre-pregnancy BMI, the expected weight needed for the current period of gestation can be calculated using the Gestational Weight Recommendations, Institute of Medicine. The difference between current weight and expected weight would help to analyse the excess or deficit in weight gain at the current period of gestation.

Pre-pregnancy BMI category (kg/m <sup>2</sup> )	Total weight gain (kg)	Rate of Weight gain 2 <sup>nd</sup> and 3 <sup>rd</sup> trimester (kg/week)
Underweight	12.5 – 18	0.51
Normal	11.5 – 16	0.42
Overweight	7 – 11.5	0.28
Obese I & II	5 – 9	0.22

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Expected weight for the different pre-pregnancy BMI category can be calculated as follows:

Expected weight at current period of gestation

$$= [\text{Current period of gestation (in weeks)} - 12 \text{ weeks of first trimester}] \times \text{Rate of weight gain corresponding to pre-pregnancy BMI}$$

$$= \text{Average weight gain/week}$$

$$= \text{Average weight gain/week} + \text{Pre pregnancy weight}$$

**iv. Energy**

Pre-pregnancy BMI category (kg/m <sup>2</sup> )	1 <sup>st</sup> trimester (kcal/kg)	2 <sup>nd</sup> trimester (kcal/kg)	3 <sup>rd</sup> trimester (kcal/kg)
Underweight	30	36-40	36-40
Normal	30	36	36-38
Overweight	24	24	24
Obese I & II	12-14	12-14	12-14

Total energy requirement should never go below 1500kcalories/day or 50% restriction is not recommended for increased chances of ketosis (Magon et.al, 2011).

**v. Protein**

The average protein requirement of 1.1g/kg ideal body weight is needed which is 60-70g/day (Salis, et.al 2021). An additional 9.5g protein/day in the second trimester and 22g protein/day in the third trimester is the recommendation as per RDA, ICMR-NIN,2020

**vi. Fat**

According to the RDA, ICMR-NIN 2020 guidelines, a minimum of 20-35% of energy should be contributed through fats of which 30g can be visible fat.

**vii. Carbohydrate**




Managing carbohydrate is the greatest change in managing elevated blood glucose levels. The RDA for carbohydrate is set at a minimum of 175g/day for adequate foetal growth and development. (RDA, ICMR-NIN,2020)

**viii. Dietary fibre**

Maintenance of adequacy of fibre in diet during pregnancy is essential for keeping safe limits of blood glucose levels as well as improving satiety and preventing constipation. The RDA for fibre in pregnancy is 40g/2000kcal per day.(RDA, ICMR-NIN,2020)

**ix. Other micronutrients**




All other important micronutrients needed during pregnancy such as iron, folic acid, vitamin D, iodine, vitamin C, calcium, etc needs to be met as per the RDA, ICMR\_NIN, 2020.

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**Annexure 7.3**  
**Diet counselling guidelines for Medical Nutrition Therapy**

- Carbohydrate selection and distribution: Recommend the use of complex carbohydrates such as whole grain cereals and reducing simple carbohydrates like sugar, honey and refined flour.
- Diet advice for avoidance of large amounts of carbohydrate in meals and spreading carbohydrates over three small meals and two to three snacks each day than three large meals.
- Protein adequacy: Suggest inclusion of at least three serving of protein foods every day to meet the protein demands. Protein rich foods such as milk and milk products, egg, fish, whole pulses and dals should be used regularly. Red meats if used should be consumed in moderation and lean cuts used.
- Use of shell fishes, deep sea fishes: Diet advice to avoid shell fishes, deep sea fishes to avoid allergies, high mercury content which can harm the developing foetus.
- Fat Intake: Recommend to use saturated fat at less than ten percent of total calories and total dietary cholesterol less than 300mg per day. Diet advice to avoid the use of deep fried foods.
- Fibre intake: Encourage high fibre foods such as leafy vegetables, salads, whole pulses, whole cereals, fruits (as per total calories planned)
- Fluid intake: Recommend adequate hydration throughout the day by drinking at least 8-10 glasses of water per day. Limit the intake of beverages like coffee, tea due to their high caffeine content.
- Iron, Calcium and Folate rich foods: Encourage the use of iron, calcium and folate rich foods in the daily diet.
- Use 'My plate' concept of ICMR-NIN for teaching portion control as well as bringing the concept of balanced meal plan.
- Order of eating for GDM women: Begin every meal with fibre rich foods like vegetables, followed by a protein rich dishes like dals, pulses, fish, egg or chicken and finally and lastly have carbohydrates such as rice, wheat, oats etc.

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- Gestational weight gain: Explain the importance of expected gestational weight gain and total gestational weight gain needed based on pre-pregnancy BMI.
- Self monitoring of blood glucose (for GDM women): Target values for self monitoring of blood glucose, both fasting blood sugar and post prandial blood sugar and frequency of blood glucose test using glucometer.
- Physical activity: Recommend physical activity in the form of walking for 30 minutes three to five times per week (Physical activity to be planned only after getting fitness clearance from the consulting doctor).

Prepared By

Sindhu S.  
Regd. Dietitian & PhD Scholar,  
Avinashilingam Institute for Home  
Science and Higher Education for  
Women, Coimbatore.

Reviewed By

Swapna I.  
Regd. Dietitian & Deputy Manager,  
Dept. of Nutrition and Dietetics,  
Renai Medicity,  
Kochi.

Approved By

Dr. Sophia Jaleel  
Manager,  
Quality and Patient Safety,  
Renai Medicity  
Kochi



FOR RESEARCH PURPOSE ONLY

## APPENDIX VIII

### Sample of a Customised Diet Plan

Name: Mrs. X      Age: 32 years      Date: 12-04-2022

Weight gain totally recommended till 9 months completion = 11.5 to 16kg

Weight gain per month = 1.68kg per month from 4<sup>th</sup> month onwards

**Gestational Diabetes Mellitus Risk Score: HIGH RISK**

**Since you are in high risk category, simple carbohydrates like sugar, honey, jaggery and sugar containing foods like sweets, pastries, cakes, chocolates, ice creams etc. should be avoided**

**Proprietary products like Horlicks, Boost etc. also should not be used. Instead you can use Horlicks lite ( in moderation 1 teaspoon (5g) per cup of milk**

**If avoiding sugar is very difficult in beverages you can use Sucralose containing artificial sweetners like Sugar free Natura or Stevia. ( 2 pellets per cup of beverage).**

**2000 kilocalories, 63g protein diet ( Diet Plan to be reviewed after 1 month)**

**6-6.30 am Early morning:** Light Tea or Coffee (with milk 150ml) No sugar

**8-9.00am Breakfast:**

Option 1 – Idli 3 nos or Dosa 3 nos with Sambar 1 Cup and tomato or mint or onion chutney 4 tbsps

Option 2 – Appam 3nos or Idiyappam 3nos with any pulse or dal curry 1 Cup (Bengal gram/ Green Peas/ Green Gram) or 2 eggwhites

Option 3 – Puttu 1 ½ Pieces or Upma 1 ½ Cups with any pulse or dal curry 1 Cup (Bengal gram/ Green Peas/ Green Gram) or 2 egg whites

**2 egg whites can be used instead of veg proteins daily. If using whole egg use it 1-2 times per week**

**10.30-11.30am Midmorning:**

Option 1- Lime juice 300ml (1 ½ glasses) or Buttermilk 300ml (1 ½ glasses) or Veg soup 300ml (1 ½ glasses) or Tomato Soup 300ml (1 ½ glasses). Or Green salad Or Sprouts salad 1 cup

Option 2 – Cut fruits (1 Cup) or Fresh fruits (Apple 1 No. Or Orange 1 No. Or Sweet lime 1 No. Or Guava 1 No. Or Pear 1 No. Or Watermelon 1 Big piece or Robesta 1 no. Or Pomegranate 1 No.)

**1-2pm Lunch:**

Rice 2 Cups

With Vegetable sauté or Vegetable thoran or Vegetable salad or Green leafy veg thoran 1 Cup

( Use low calorie vegetables like ladies finger, snakegourd, ashgourd, cucumber, brinjal, tomatoes, cabbage, cauliflower, kovakai, ridgegourd, beans, long beans, carrot, beetroot, cluster beans, banana flower, banana stem etc. rather than potatoes, yam, tapioca, colaccasia, raw banana, jackfruit tender.)

If using potatoes, yam etc..mix it with other vegetables and then only consume. All leafy vegetables to be used at least 2-3 times per week

Sambar 1 Cup or Dals or Any pulses ½ Cup or Fish (75 or 1 medium piece) or Chicken or Lean meat (75g or 1 medium piece)

**Fish can be taken 2-3times per week, Chicken once per week or Lean meat once or twice a month**

Buttermilk 1 cup or Curd ½ cup (**Curd and buttermilk are probiotic foods and help maintain the intestinal microbiota. Try to include any one during lunch time at least**)

**4-4.30pm Teatime:**

Light Tea with Milk 150ml and sugar 1 tsp with High fibre biscuits 2 Nos. Or Vegetable sandwich 2 slices or Aval upma ½ cup or Ada 1 no. or Kozhukatta 1 nos.(plain or spicy filling) or Idli 1 no. or Dosa 1 no. or Appam 1 no. or Idiyappam 1 no. or Veg Upma ½ cup or ½ Cup of Boiled and sautéed Pulses ( Cherupayar, White Kadala or Brown Kadala) or Steamed Sprouts and Vegetable Salad ½ Cup

**6-6.30pm :** Cut fruits (1 Cup) or Fresh fruits (Apple 1 No. Or Orange 1 No. Or Sweet lime 1 No. Or Guava 1 No. Or Pear 1 No. Or Watermelon 1 Big piece or Robesta 1 no. Or Pomegranate 1 No.)

**8-9pm Dinner:** Same as breakfast or lunch but keep the carbohydrates 3 Nos or 1 ½ Cups

**For proteins use only vegetable protein for dinner like dals or pulses ½ cup or sprouts ½ cup**

**Consume protein rich foods in all main meals**

**Total allowance for low fat milk and milk products per day = 300ml (1 ½ 2cups)**

**Total allowance for oil/butter etc. 3-4tsps per day**

**Total allowance for coconut 3- tbsps per day**

**A fistful of mixed nuts (almonds, walnuts, hazelnuts, pistachio, groundnuts, cashew, sunflower seeds, pumpkin seeds, flax seeds) can be included any time once in the diet plan.**

**Points to remember**

- Always have small frequent meals rather than large meals
- Use low calorie drinks (salted lime juice, amla juice, tomato juice, cucumber-mint-ginger-lime juice, clear soups, buttermilk) and green salads liberally whenever you feel hungry.
- Drink upto 12 glasses of water per day
- Try to incorporate more fibre in your diet.eg. combine two cereals while making chappathis, dosas etc..wheat+ragi, wheat+oats, rice+wheat etc.
- Use chopped vegetables and leafy veg in your chappathis, dosas, idlis, upma etc to add more bulk
- Use combination of oils ( coconut oil and sunflower oil; coconut oil and groundnut oil; coconut oil and rice bran oil)
- Avoid taking too much oil, coconut, coconut milk etc. in your meals as they contribute higher calories and fat
- Avoid fried foods and thick gravies of curries
- Avoid drinking strong coffee, tea and chocolates
- Avoid taking too much of carbohydrates in your meals. Consume according to the diet plan

Use garlic, ginger, lime, amla, fenugreek, turmeric, red, yellow and orange coloured vegetables and fruits etc. in your diet as they are very good antioxidants

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APPENDIX IX

Questionnaire for Content Validation of SSOP for MNT

**CONTENT VALIDATION OF SUSTAINABLE STANDARD  
OPERATING PROTOCOL (SSOP) FOR MEDICAL NUTRITION  
THERAPY IN GESTATIONAL DIABETES MELLITUS**

Respected Sir /Madam,

I am Sindhu S., PhD Scholar, Department of Food Service Management and Dietetics, Avinashilingam Deemed University, Coimbatore. As part of my research, I am developing a sustainable standard operating protocol for medical nutrition therapy in GDM. The protocol aims to identify pregnant women at risk of developing GDM and following a systematic nutrition care process involving nutrition screening, assessment, diagnosis, intervention, monitoring and evaluation for effective GDM management and prevention. This questionnaire is made for the purpose of obtaining your valuable recommendations and suggestions so as to validate the contents of the protocol.

Name:

Profession:

Obstetrician/Gynaecologist

Diabetologist/Endocrinologist

Dietitian/Nutritionist

Academician Quality Control Manager/NABH Assessor

Phone number:

Email id:

Years of clinical experience: less than 10 years greater than 10 years

Nutrition Screening of all pregnant women at first visit to the hospital can be done using the validated Android App based GDM risk screening tool (Reference tool used: GDM Screening Tool, National Institute of Health and American Diabetic Association).

Yes No

The validated Android App based tool may be used at subsequent visits to update patient details ( gestational weight gain, blood glucose tests, haemoglobin levels, blood pressure values, TSH values) throughout the entire period of pregnancy.

Yes No

After Nutrition Screening and Assessment, identification of GDM Risk Category will be done as follows: **High Risk, Moderate Risk and Low Risk**

Yes No

Nutrition Diagnosis based on Problem, Etiology, Signs and Symptoms (PES) shall be formulated after screening and assessment

Yes No

Nutritional Intervention for **GDM High Risk pregnant women** shall be done as follows:

- (i) Diet consultation and issuing of a customised diet plan based on the recommended guidelines ( Ref: ICMR, NIN and Management of GDM : A comprehensive review, 2021)
  - (ii) Three group sessions, one each for each trimester on topics namely Nutrition in Pregnancy, Gestational Weight Gain, Exercise, GDM diagnosis and prevention, SMBG and Nutrition in Lactation
  - (iii) Monthly review with Dietitian
  - (iv) Post natal diet consultation and issuing of e-Lactation and Weaning Food Booklet
- Yes No

Nutritional Intervention for **GDM Moderate Risk pregnant women** shall be done as follows:

- (i) Diet consultation at first visit only
  - (ii) Three group sessions, one each for each trimester on topics namely Nutrition in Pregnancy, Gestational Weight Gain, Exercise, GDM diagnosis and prevention, SMBG and Nutrition in Lactation
  - (iii) Post natal diet consultation and issuing of e-Lactation and Weaning Food Booklet
- Yes No

Nutritional Intervention for **GDM Low risk pregnant women** shall be done as follows:

- (i) Diet consultation at first visit only
  - (ii) Only one group session on Nutrition in Pregnancy, Gestational Weight Gain, Exercise, GDM diagnosis and prevention, SMBG and Nutrition in Lactation
  - (iii) Post natal diet consultation and issuing of e-Lactation and Weaning Food Booklet
- Yes No

If any GDM Average Risk or GDM Low Risk pregnant women moves to GDM High Risk category based on subsequent screening with the App, intervention should be started as per GDM High Risk group

Yes No

Nutrition Monitoring and Evaluation shall be done as follows:

- (i) Nutritional review after 45 days upon delivery for GDM High Risk women and women detected with GDM (ii) Second Nutritional review after 3 months ( Pre-conception nutritional counselling)

Yes No

Setting up of a monthly Pre-Conception Nutrition Counselling Clinic for young adults and married couple at the hospital towards increasing awareness for prevention of GDM can be recommended

Yes No

Any further suggestions or recommendations for Nutrition screening, assessment, diagnosis, intervention, monitoring and evaluation

Yes No

If yes, please mention the suggestions:

**APPENDIX X**

**Questionnaire for Content Validation of Mobile App for SSOP for MNT for HCPs**

**VALIDATION OF A MOBILE APP FOR SSOP FOR MNT OF  
GESTATIONAL DIABETES MELLITUS**

Respected Sir / Madam,

I am Sindhu S., PhD Scholar, Department of Food Service Management and Dietetics, Avinashilingam Deemed University, Coimbatore. As part of research, I am developing a screening cum nutrient calculation

tool (Android based App) for gynaecologists/obstetricians, diabetologists / endocrinologists, nutritionists/ dietitians and ObGyn nurses. This questionnaire is made for the purpose for obtaining your valuable recommendations and suggestions so as to validate the contents of the tool.

Name:

Profession:

Gynaecologist/Obstetrician     Diabetologist/Endocrinologist    Dietitian/Nutritionist  
Nurse

Phone number:

Email id:

Years of clinical experience:                      less than 10 years                      greater than 10  
years

For early screening of GDM are the questions in the 'Modified Early Screening for GDM for Indians' relevant and satisfactory?                      Yes    No

Any further suggestions:

... Existing Guidelines: Early Screening for GDM (National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, American Diabetic Association)

- |  | Yes | No |
|--|-----|----|
| 1. Are you a member of a high risk ethnic group (African American, Native American, Hispanic, Pacific Islander)? |     |    |
| 2. Are you overweight or very overweight?  |     |    |
| 3. Are you related to anyone who has diabetes now or had diabetes in their lifetime?                             |     |    |
| 4. Are you older than 25?  |     |    |
| 5. Did you have gestational diabetes with a past pregnancy?  |     |    |
| 6. Have you had a stillbirth or a very large baby with a past?   |     |    |
| 7. Do you have a history of abnormal glucose tolerance?  |     |    |
| <b>High risk:</b> Yes to two or more questions   |     |    |
| <b>Average Risk:</b> Yes to only one questions   |     |    |
| <b>Low Risk:</b> No to all questions   |     |    |

Modified Early Screening for GDM for Indians (for the current study)

- |   | Yes | No |
|---|-----|----|
| 1. Age greater than 25 years                                |     |    |
| 2. Family history of Type 2 DM                              |     |    |
| 3. Previous history of GDM                                  |     |    |
| 4. High BMI based on pre pregnancy weight                   |     |    |
| 5. Previous history of still birth or macrosomia            |     |    |
| 6. Previous history of polyhydramnios/excessive weight gain |     |    |
| 7. Previous history of impaired glucose tolerance           |     |    |
| 8. Previous history of PCOS                                 |     |    |
| <b>High risk:</b> Yes to two or more questions              |     |    |
| <b>Average Risk:</b> Yes to only one question               |     |    |
| <b>Low Risk:</b> No to all questions                        |     |    |

For estimating pre-pregnancy BMI (proposed to be used in the study) is it advisable to use the BMI classification of Asians?  Yes  No

Any further suggestions:

... Existing Pre-pregnancy BMI Classification (based on WHO BMI Classification for Global population)

**Pre-pregnancy BMI**

Underweight	<18.5kg/m <sup>2</sup>
Normal weight	18.5-24.9kg/m <sup>2</sup>
Overweight	25-29.9kg/m <sup>2</sup>
Morbidly obese	> 30kg/m <sup>2</sup>

**Pre-pregnancy BMI Classification (based on WHO BMI Classification for Asian population): Proposed to be used in the research**

**Pre-pregnancy BMI**

Underweight	<18.5kg/m <sup>2</sup>
Normal weight	18.5-22.9kg/m <sup>2</sup>
Overweight	23-24.9kg/m <sup>2</sup>
Obese	≥ 25kg/m <sup>2</sup>

For calculation of energy, protein requirements and macro nutrient distribution are the following guidelines reliable and satisfactory?

References: ICMR NIN, 2020 and Management of GDM: A comprehensive review,2021

Yes  No

Any further suggestions:

Category	Energy (kcal)			Protein(g)			Fat(g)		
	1 <sup>st</sup> trimester	2 <sup>nd</sup> trimester	3 <sup>rd</sup> trimester	1 <sup>st</sup> trimester	2 <sup>nd</sup> trimester	3 <sup>rd</sup> trimester	1 <sup>st</sup> trimester	2 <sup>nd</sup> trimester	3 <sup>rd</sup> trimester
Prepregnancy BMI									
Underweight	30	36-40	36-40	1.1g/kg	Additional 9.5g	Additional 22g	30	30	30
Normal	30	36	36-38	1.1g/kg	Additional 9.5g	Additional 22g	30	30	30
Overweight	24	22-25	22-25	1.1g/kg	Additional 9.5g	Additional 22g	30	30	30
Morbidly Obese	12-14 (Minimum 1800kcal/day to prevent ketosis)			1.1g/kg	Additional 9.5g	Additional 22g	30	30	30

**Macronutrient Distribution**

Carbohydrates 33-45% of total calories

Proteins 20% of total calories

Fat 35-40% of total calories

Can ICMR NIN 2020 guidelines for pregnant women be used for all other nutrient requirements?

Yes       No

Any further suggestions:

**SUMMARY OF RDA FOR INDIANS – 2020**

Age Group	Category of work	Body Wt (kg)	Protein (g/d)	CHO (g/d)	Cal cium (mg/ d)	Magne tium (mg/ d)	Iron (mg/ d)	Zinc (mg/ d)	Iodine (µg/ day)	Thiamine (mg/ d)	Ribo flavin (mg/ d)	Niacin (mg/ d)	Vit B6 (mg/ d)	Folate (µg/ d)	Vit B12 (µg/ d)	Vit C (mg/ d)	Vit A (µg/ d)	Vit D (IU/ d)
	Moderate									1.8	2.5	18	2.4					
	Heavy									2.3	3.2	23	3.1					
	Sedentary	55	45.7	130	1000	325	29	13.2	150	1.4	1.9	11	1.9	220	2.5	65	840	600
	Moderate									1.7	2.4	14	1.9					
	Heavy									2.2	3.1	18	2.4					
Women	Pregnant woman	55 + 10	+9.5 (2 <sup>nd</sup> trimester) +22.0 (3 <sup>rd</sup> trimester)	175	1000	385	40	14.5	250	2.0	2.7	+2.5	2.3	570	+0.25	+15	900	600
	Lactation 0-6m		+16.9	200	1200	325	23	14	280	2.1	3.0	+5	+0.26	330	+1.0	+50	950	600
	7-12m		+13.2	200						2.1	2.9	+5	+0.17	330				
Infants	0-6 m*	5.8	8.1	55	300	30	-	-	100	0.2	0.4	2	0.1	25	1.2	20	350	400
	6-12m	8.5	10.5	95	300	75	3	2.5	130	0.4	0.6	5	0.6	85	1.2	27	350	400
Children	1-3y	11.7	11.3	130	500	135	8	3.0	90	0.7	0.9	7	0.9	110	1.2	27	390	600
	4-6y	18.3	15.9	130	550	155	11	4.5	120	0.9	1.3	9	1.2	135	1.2	32	510	600
	7-9 y	25.3	23.3	130	650	215	15	5.9	120	1.1	1.6	11	1.5	170	2.5	43	630	600
	Boys 10-12y	34.9	31.8	130	850	270	16	8.5	150	1.5	2.1	15	2.0	220	2.5	54	770	600
	Girls 10-12y	36.4	32.8	130	850	255	28	8.5	150	1.4	1.9	14	1.9	225	2.5	52	790	600
	Boys 13-15y	50.5	44.9	130	1000	355	22	14.3	150	1.9	2.7	19	2.6	285	2.5	72	930	600
	Girls 13-15y	49.6	43.2	130	1000	325	30	12.8	150	1.6	2.2	16	2.2	245	2.5	66	890	600
	Boys 16-18y	64.4	55.4	130	1050	405	26	17.6	150	2.2	3.1	22	3.0	340	2.5	82	1000	600
	Girls 16-18y	55.7	46.2	130	1050	335	32	14.2	150	1.7	2.3	17	2.3	270	2.5	68	860	600



\* AI

Demographic details in the App are as follows. Is it adequate?

Yes       No


Any further suggestions:

22:54 100% 4G LTE

 **G Mom** 

**PERSONAL DETAILS**

Name

Date of Birth  
 






Mobile




Email

Education

Employment

Activity Level

Medical details in the App are as follows. Is it adequate?

Yes       No

Any further suggestions:

The screenshot shows a mobile application interface for a pregnant woman named 'G Mom'. The interface includes the following elements:

- Header:** A teal icon on the left, the name 'G Mom' in the center, and a red menu icon on the right.
- Section Header:** 'Medical Details' with a dashed underline.
- Current Period of gestation:** A text input field followed by a dropdown menu currently set to 'Week'.
- Height:** Two buttons labeled 'centimeter' and 'Feet' for unit selection.
- Pre pregnancy Weight:** A large empty text input field.
- Current Weight:** A large empty text input field.
- Pregnancy Details:** A dropdown menu currently set to 'Single pregn..'.
- History of Diabetes:** Radio buttons for 'No' and 'Yes'.
- History of GDM:** Radio buttons for 'No' and 'Yes'.
- History of still birth or a very large baby:** Radio buttons for 'No' and 'Yes'.
- History of impaired glucose tolerance:** Radio buttons for 'No' and 'Yes'.
- Bottom Bar:** A teal bar with five calendar icons, the second one highlighted in red.
- Android Navigation Bar:** Visible at the very bottom of the screen.

Lab details in the App are as follows. Are these adequate?

Yes       No

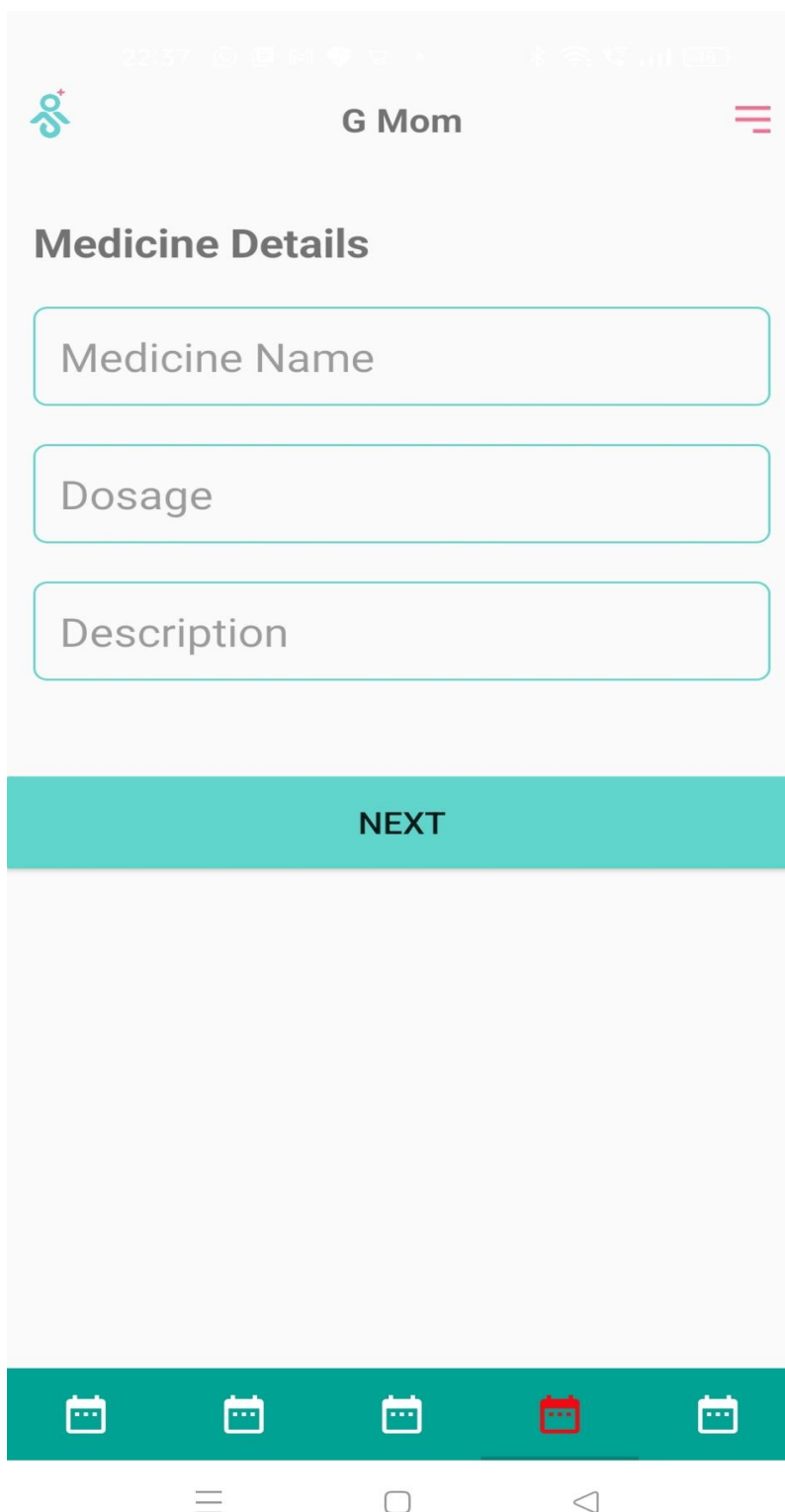
Any further suggestions:

The screenshot shows a mobile application interface for 'G Mom'. At the top, there is a status bar with the time 12:37 and various icons. Below the status bar is a header with a user icon, the name 'G Mom', and a menu icon. The main section is titled 'Laboratory Details'. It contains several input fields: 'Examination Date' with a calendar icon, 'Haemoglobin (g/dl)', 'Fasting blood glucose FBS(mg/dl)', and '2 hr Post prandial blood glucose'. There are two radio buttons for 'IADPSG' (selected) and 'DIPSI'. Below these are input fields for 'Fasting', 'OGTT After 1 Hr', 'After 2 Hr', and 'Before Breakfast'. At the bottom, there is a teal navigation bar with five calendar icons, and a standard Android navigation bar with back, home, and recent apps buttons.

Medicine/Drug details in the App are as follows. Is it adequate?

Yes       No

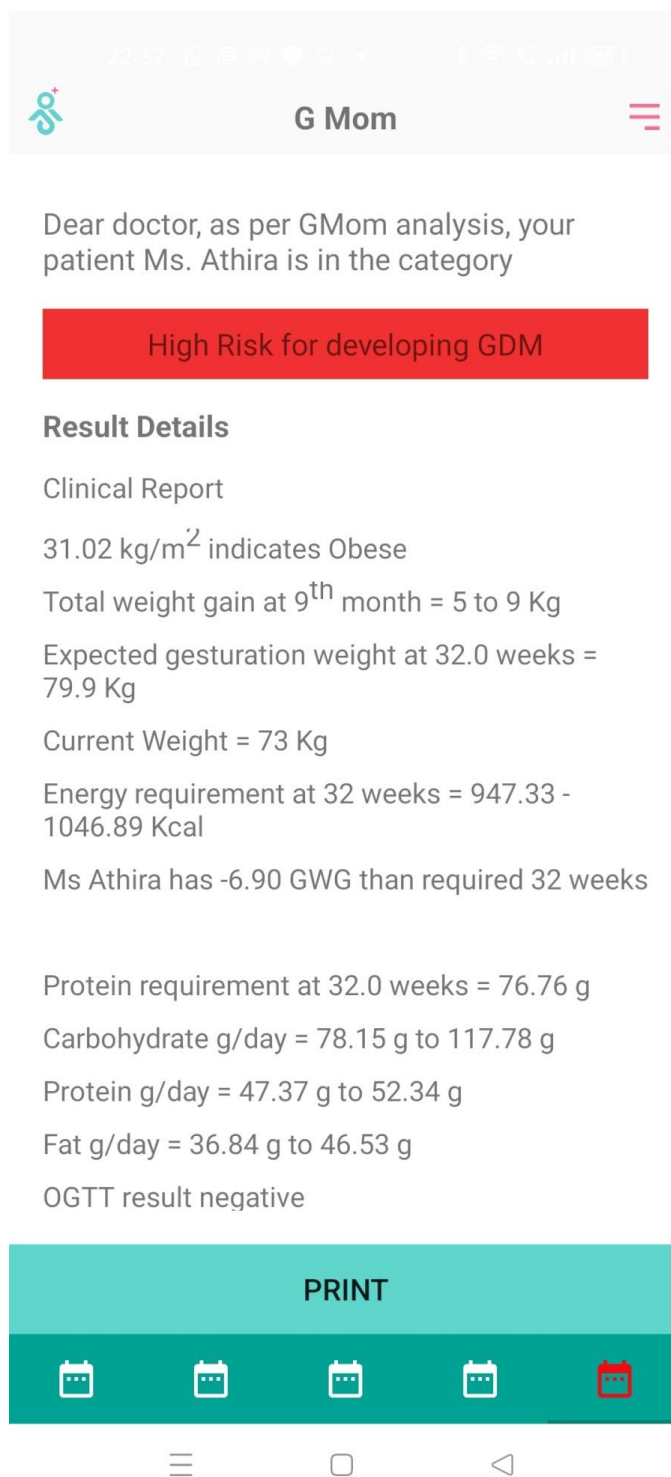
Any further suggestions:



The Result screen in the App is as follows. Is this adequate?

Yes       No

Any further suggestions:



Any further contents to be added in the App?

**APPENDIX XI**

**Questionnaire for Usability of the Mobile App using System Usability Scale**

**FEED BACK ON USABILITY OF THE MOBILE APP USING SYSTEM USABILITY SCALE**

Respected Sir/Madam,

I am Sindhu S., PhD Scholar, Department of Food Service Management and Dietetics, Avinashilingam Deemed University, Coimbatore. As part of research, I developed an Android based App named GMom for screening and monitoring of Gestational Diabetes Mellitus as well as calculating the dietary requirements for pregnant women for use by HCPs particularly doctors and dietitian. This questionnaire is made for the purpose of obtaining your feedback on the usability of the App. I am inviting you to participate in this survey.

Name

Email

Contact number

Profession

- a) Gynaecologist/Obstetrician
- b) Diabetologist/Endocrinologist/General Physician
- c) Dietitian/Nutritionist

Institution

- a) Private Multispecialty Hospital
- b) Private Clinic
- c) Govt Hospital
- d) Others

Total years of clinical experience

- a) less than 10 years
- b) 10-20 years
- c) greater than 20 years

Age

- a) less than 30 years
- b) 30 to 40 years
- c) greater than 40 years

1. I think that I would like to use this App more frequently during consultation of pregnant women

- a) Strongly disagree
- b) Disagree

- c) Neutral
- d) Agree
- e) Strongly Agree

2. I found the App unnecessarily complex

- a) Strongly disagree
- b) Disagree
- c) Neutral
- d) Agree
- e) Strongly Agree

3. I thought the App was easy to use

- a) Strongly disagree
- b) Disagree
- c) Neutral
- d) Agree
- e) Strongly Agree

4. I think that I would need the support of a technical person to be able to use the App

- a) Strongly disagree
- b) Disagree
- c) Neutral
- d) Agree
- e) Strongly agree

5. I found the various functions in this App were well integrated

- a) Strongly disagree
- b) Disagree
- c) Neutral
- d) Agree
- e) Strongly Agree

6. I thought there was too much inconsistency in this App

- a) Strongly disagree
- b) Disagree
- c) Neutral
- d) Agree
- e) Strongly Agree

7. I would imagine that most healthcare professionals involved in treating pregnant women would learn to use this App very quickly
- a) Strongly disagree
  - b) Disagree
  - c) Neutral
  - d) Agree
  - e) Strongly Agree
8. I found the App very cumbersome to use
- a) Strongly disagree
  - b) Disagree
  - c) Neutral
  - d) Agree
  - e) Strongly agree
9. I felt very confident using the App
- a) Strongly disagree
  - b) Disagree
  - c) Neutral
  - d) Agree
  - e) Strongly agree
10. I needed to learn a lot of things before I could get going with this App
- a) Strongly agree
  - b) Agree
  - c) Neutral
  - d) Disagree
  - e) Strongly Disagree

**APPENDIX XII**

**GDM Risk Screening Tool**

**GDM SCREENING FORM**

Name of Patient: \_\_\_\_\_ Age: \_\_\_\_\_ Hospital No: \_\_\_\_\_  
 Phone number: \_\_\_\_\_ Email Id: \_\_\_\_\_  
 Education: \_\_\_\_\_ Employment: \_\_\_\_\_  
 Activity level: \_\_\_\_\_

Current Period of gestation (weeks) (months)  
 Height (cm) (feet) (inches)  
 Pre pregnancy Weight (kg) Current Weight (kg)

**GDM Risk Screening**

- |   |                                 |                                 |
|---|---------------------------------|---------------------------------|
| 1. Age above 25 years                                   | Yes                             | No                              |
| 2. BMI $\geq 25 \text{kg/m}^2$                          | Yes                             | No                              |
| 3. Family History of Diabetes                           | Yes                             | No                              |
| – If Yes,   | <input type="checkbox"/> Father | <input type="checkbox"/> Mother |
| 4. Previous History of GDM                              | Yes                             | No                              |
| 6. Previous History of still birth or a very large baby | Yes                             | No                              |
| 7. Previous History of impaired glucose tolerance       | Yes                             | No                              |
| 8. Previous History of PCOS/Hypothyroidism              | Yes                             | No                              |

**High risk: Yes to two or more questions**

**Average Risk: Yes to only one question**

**Low Risk: No to all questions**

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Screening done by \_\_\_\_\_

Signature \_\_\_\_\_

Source: "Am I at risk for gestational diabetes?" of *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, US Department of Health and Human Services, National Institutes of Health, 2012

APPENDIX XIII

Power point Presentation used for Nutrition Education Sessions

### Nutrition in Pregnancy – What we need to know



**Sindhu S.**  
PhD Scholar,  
Avinashilingam Deemed University,  
Coimbatore

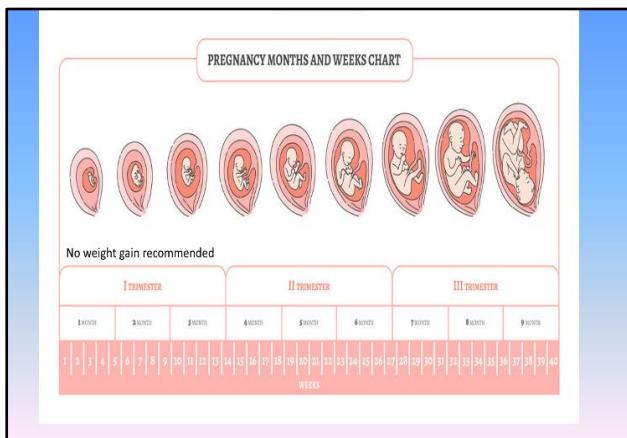
Registered Dietitian & Consultant Clinical  
Nutritionist,  
Nuyoga, Milestones Clinic for Children  
Diabetic Care India, Kochi

### HOW MUCH WEIGHT SHOULD YOU GAIN WHEN YOU'RE PREGNANT?


How to calculate your Body Mass Index (BMI)  $BMI = \frac{\text{weight (kg)}}{\text{height (m)} \times \text{height (m)}}$

If you start your pregnancy as...

Underweight BMI less than 18.5	You should gain... 12.5 - 18kg
Normal Weight BMI 18.5 - 24.9	11.5 - 16kg
Overweight BMI 25.0 - 29.9	7.0 - 11.5kg
Obese BMI ≥ 30.0	5.0 - 9.0kg

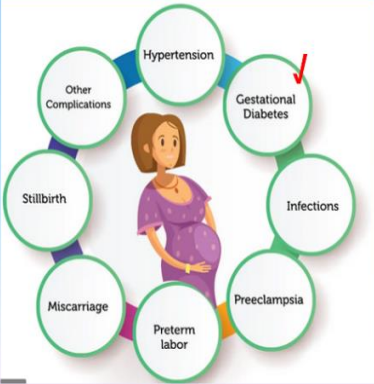


### CONSEQUENCES OF GESTATIONAL DIABETES



FOR THE MOTHER	FOR THE BABY
<ul style="list-style-type: none"> <li>High blood pressure</li> <li>Preeclampsia, can affect mother and baby</li> <li>Type 2 diabetes (50% develop T2D within 10 years)*</li> </ul>	<ul style="list-style-type: none"> <li>Premature birth and malformations</li> <li>Respiratory problems</li> <li>Fetal death</li> <li>Macrosomia (excessive birth weight)</li> <li>Cesarean birth</li> <li>Hypoglycemia and hyperbilirubinemia</li> <li>Obesity and type 2 diabetes in adulthood*</li> </ul>

### Common Complications in Pregnancy



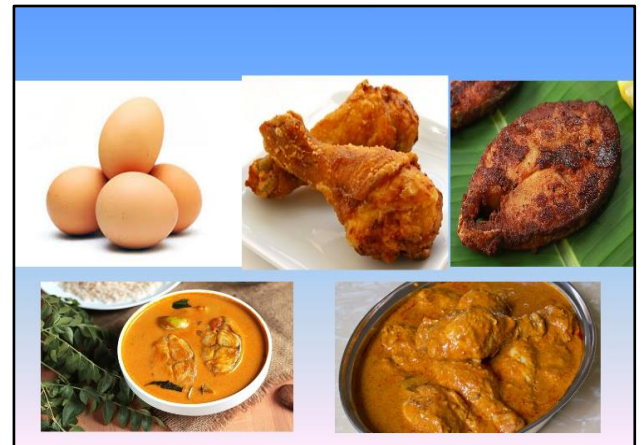
### Recommended Dietary Allowances

Nutrients	Adult woman (Sedentary, Body wt:55kg)	First Trimester	Second Trimester	Third Trimester
Energy (Kcal)	1660	1660	+350 ↑	+350 ↑
Carbohydrate (g)	130	130	+45 ↑	+45 ↑
Protein (g)	55	65 ↑	+9.5 ↑	+22 ↑
Fat(g)	20	30 ↑	30 ↑	30 ↑
Iron (mg)	29	40 ↑	40 ↑	40 ↑
Calcium (mg)	1000	1000	1000	1000
Folic acid(µg)	220	570 ↑	570 ↑	570 ↑
Vitamin C(mg)	65	+15 ↑	+15 ↑	+15 ↑
Vit B1,B2,B3,B6 (mg)	1.4,1.9,11,1.9	=	↑	↑

### ENERGY RICH FOODS



### PROTEIN RICH FOODS



### Iron rich foods



### Calcium rich foods



### Folic acid rich foods



### Stay away from these

- Unfamiliar foods
- Shell fishes
- Deep sea big fishes
- Caffeinated and carbonated beverages
- Deep fried foods, spicy foods and sweets
- Junk foods
- Smoking & Alcohol

### HIGH CALORIE FOODS



### My Plate for the Day

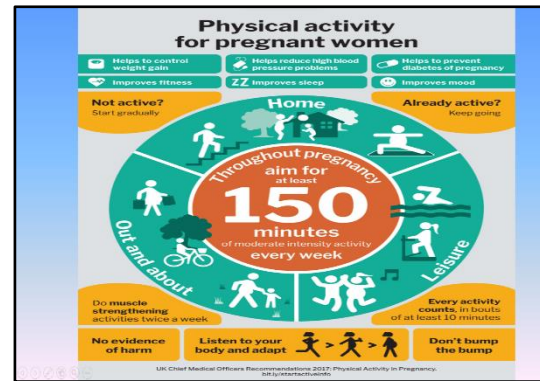
to Prevent Hidden Hunger



### Let there be lots of colours in your plate



More colours = ↑vitamins, minerals, antioxidants



### MNT Guidelines

- Use complex carbohydrates: Whole grain cereals, reduce simple carbohydrates like sugar, honey and refined flour
- Spread carbohydrates over 3 small meals and 2-3 snacks /day than 3 large meals  
Include at least 3 servings of protein foods every day to meet the protein demands.
- Protein rich foods: Regularly use milk and milk products, egg, fish, whole pulses
- Chicken and red meats if consumed, in moderation and lean cuts used
- Avoid shell fishes, deep sea fishes to avoid allergies, high mercury content which can harm the developing foetus.
- Use saturated fat at <10 % of total calories and total dietary cholesterol < 300mg/day  
Avoid deep fried foods

### MNT Guidelines

- Use high fibre foods such as leafy vegetables, salads, whole pulses, whole cereals, fruits (as per total calories planned)
- Ensure adequate hydration throughout the day, drink at least 8-10 glasses of water per day. Limit the intake of beverages like coffee, tea due to high caffeine content
- Use iron, calcium and folate rich foods daily
- Use 'My plate' concept of ICMR-NIN while planning and consuming meals
- Practice order of eating: Begin every meal with fibre rich foods like vegetables, followed by a protein rich dishes like dals, pulses, fish, egg or chicken and finally and lastly have carbohydrates such as rice, wheat, oats etc.

### MNT Guidelines

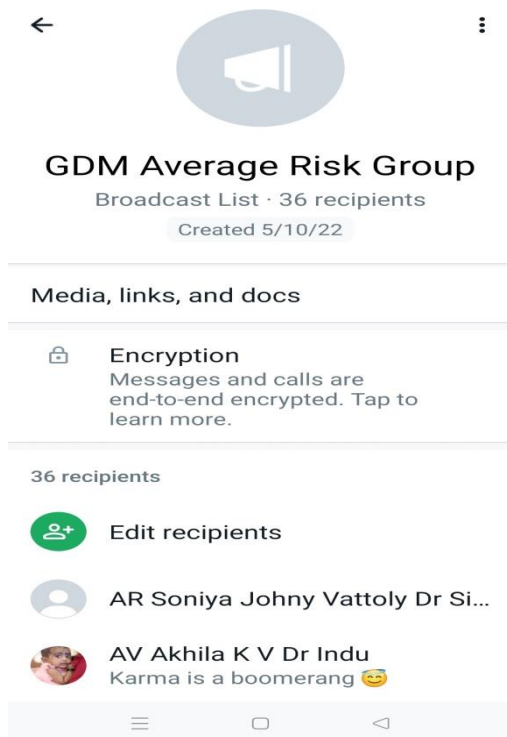
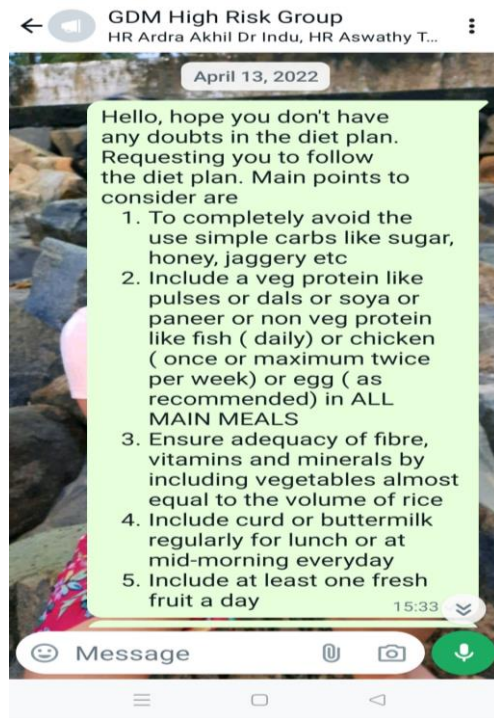
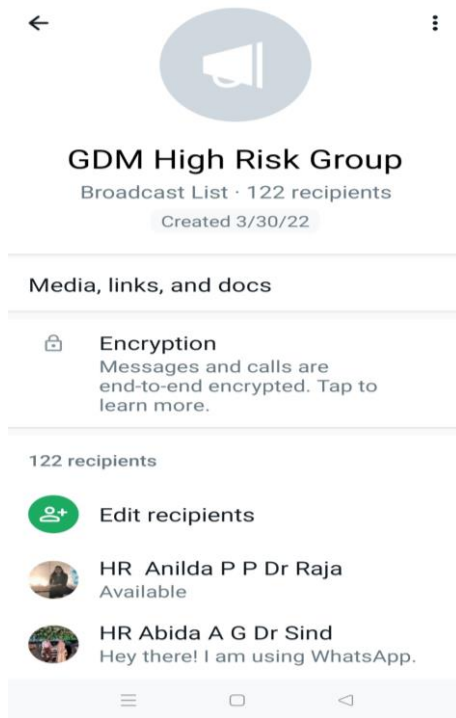
- Monitor weight gain every month and understand total gestational weight gain needed based on pre-pregnancy BMI
- Self monitoring of blood glucose (for GDM women): Understand target values for self monitoring of blood glucose, both fasting blood sugar and post prandial blood sugar and frequency of blood glucose test using glucometer
- Engage in physical activity in the form of walking for 30 minutes, 3 to 5 times per week (Physical activity to be planned only after getting fitness clearance from your consulting doctor).

Let Motherhood be the most cherished and happiest experience in your life...and not a daunting phase of emotional stress, neglected body and sleepless nights....

**THANK YOU**

APPENDIX XIV

Group Contacts created for Communication with Pregnant Women



## APPENDIX XV

### **Diet Counselling Guidelines for Medical Nutrition Therapy**

- Carbohydrate selection and distribution: Recommend the use of complex carbohydrates such as whole grain cereals and reducing simple carbohydrates like sugar, honey and refined flour.
- Diet advice for avoidance of large amounts of carbohydrate in meals and spreading carbohydrates over three small meals and two to three snacks each day than three large meals.
- Protein adequacy: Suggest inclusion of at least three serving of protein foods every day to meet the protein demands. Protein rich foods such as milk and milk products, egg, fish, whole pulses and dals should be used regularly. Red meats if used should be consumed in moderation and lean cuts used.
- Use of shell fishes, deep sea fishes: Diet advice to avoid shell fishes, deep sea fishes to avoid allergies, high mercury content which can harm the developing foetus.
- Fat Intake: Recommend to use saturated fat at less than ten percent of total calories and total dietary cholesterol less than 300mg per day. Diet advice to avoid the use of deep fried foods.
- Fibre intake: Encourage high fibre foods such as leafy vegetables, salads, whole pulses, whole cereals, fruits (as per total calories planned)
- Fluid intake: Recommend adequate hydration throughout the day by drinking at least 8-10 glasses of water per day. Limit the intake of beverages like coffee, tea due to their high caffeine content.
- Iron, Calcium and Folate rich foods: Encourage the use of iron, calcium and folate rich foods in the daily diet.
- Use 'My plate' concept of ICMR-NIN for teaching portion control as well as bringing the concept of balanced meal plan.
- Order of eating for GDM women: Begin every meal with fibre rich foods like vegetables, followed by a protein rich dishes like dals, pulses, fish, egg or chicken and finally and lastly have carbohydrates such as rice, wheat, oats etc.
- Gestational weight gain: Explain the importance of expected gestational weight gain and total gestational weight gain needed based on pre-pregnancy BMI.
- Self monitoring of blood glucose (for GDM women): Target values for self monitoring of blood glucose, both fasting blood sugar and post prandial blood sugar and frequency of blood glucose test using glucometer.
- Physical activity: Recommend physical activity in the form of walking for 30 minutes three to five times per week (Physical activity to be planned only after getting fitness clearance from the consulting doctor).

APPENDIX XVI

Healthy Recipe Videos shared to Pregnant Women



Courtesy: Manorama aarogyam , health channel, Youtube link:  
<https://youtu.be/dXGlrLcPZuQ>

Courtesy: 24 news channel, Aharakoott Youtube link:  
<https://youtu.be/Avw4Z6MX5Lw?si=wMrjpmo>



Courtesy: 24 news channel, Aharakoott Youtube link:  
[https://youtu.be/LY3Z3dNNy\\_w?si=7aD6rWV1OQ2N5yl3](https://youtu.be/LY3Z3dNNy_w?si=7aD6rWV1OQ2N5yl3)

**APPENDIX XVII**

**Questionnaire for Knowledge, Attitude and Practice Study among Selected Pregnant Women**

**KNOWLEDGE, ATTITUDE AND PRACTICE STUDY ON GESTATIONAL DIABETES MELLITUS**

Dear Madam,

Please give your responses to the below questions/statements on knowledge, attitude and practice on the topic Gestational Diabetes Mellitus

**KNOWLEDGE :**

1. Diabetes mellitus is a clinical disorder characterised by elevated blood sugar
  - a) True
  - b) False
  
2. Gestational Diabetes Mellitus (GDM) is glucose intolerance that begins or is first recognised during pregnancy
  - a) True
  - b) False
  
3. Women with GDM develop resistance to insulin and this causes blood sugar level to remain high
  - a) True
  - b) False
  
4. Early diagnosis of blood sugar in pregnancy will not help in preventing complications
  - a) True
  - b) False
  
5. If the diabetic condition goes unnoticed during pregnancy, maternal and foetal complication occurs during delivery
  - a) True
  - b) False
  
6. Women with family history of diabetes and higher maternal age are at risk of developing GDM
  - a) True
  - b) False

7. Obesity, lack of physical activity and adoption to modern lifestyle are not associated factors for developing GDM
- a) True
  - b) False
8. Previous history of abortion, miscarriage, PCOS or big baby are risk factors for developing GDM
- a) True
  - b) False
9. GDM mothers are not prone to GDM in future pregnancies
- a) True
  - b) False
10. It is important for women to screen for diabetes in pregnancy in the 16-24 weeks itself
- a) True
  - b) False
11. It is not necessary to screen earlier if previous history of GDM or other risk factors are present
- a) True
  - b) False
12. Appropriate meal plan, medication/insulin and exercise are the three cornerstones in the treatment of GDM
- a) True
  - b) False
13. When diet is insufficient to meet the glycaemic targets insulin is started
- a) True
  - b) False
14. Women with GDM are not at increased risk of developing type 2 diabetes later in life
- a) True
  - b) False
15. Maintaining normal weight and good physical activity together with diet control should be emphasized after delivery for GDM mothers
- a) True
  - b) False

16. Women with GDM need not breastfeed their babies

- a) True
- b) False

17. Breastfeeding not only helps to lower fasting blood glucose levels in mothers but also allows the body to use extra calories stored during pregnancy allowing for weightloss

- a) True
- b) False

18. GDM if not controlled through proper treatment, can result in delivery of big baby/stillbirth/go in for pre-term delivery and increased admission to NICU

- a) True
- b) False

19. A test of HbA1C is a good indicator of blood glucose control over the preceding 2-3months

- a) True
- b) False

20. Children of women who had GDM should be followed closely for development ofobesity and diabetes in early adolescence

- a) True
- b) False

**ATTITUDE:**

21. If one has risk factors like family history of diabetes and obesity, there is highchance of developing diabetes during pregnancy

- a) Yes
- b) No

22. If one had diabetes during their first pregnancy and was under diet plan only and post delivery blood glucose was normal, there is NO RISK at second pregnancy. Is it true?

- a) Yes
- b) No

23. If obstetric history was not good and had irregular periods and underwent treatment for Polycystic Ovarian Syndrome (PCOS). Is such a lady at risk for GDM?

- a) Yes
- b) No

24. If a pregnant woman has normal blood sugar in 1st trimester, should she undergo repeated screening every month for blood sugar until 36th week?

- a) Yes
- b) No

25. Is the expected normal weight gain during pregnancy 300-400g/week and total weight gain 10-12kg/term

- a) Yes
- b) No

26. Is it beneficial to distribute food in three meals and three snacks with a proper balance in carbohydrate, protein and fat during pregnancy?

- a) Yes
- b) No

27. Is it necessary to eliminate refined and processed cereals/fruit juices/fruits in breakfast?

- a) Yes
- b) No

28. If I am a case of GDM, I should undergo screening for diabetes every 6 months post delivery

- a) Yes
- b) No

29. If one is treated with insulin for their diabetic pregnancy, she need not follow any dietary regimen for treating their blood sugar

- a) Yes
- b) No

30. I should be aware of my level of activity, body mass index and ideal body weight to help me stay healthy post delivery

- a) Yes
- b) No

PRACTICE: 31. I followed an individualized diet plan to meet the nutritional requirements of pregnancy based on my body weight and activity pattern

- a) True
- b) False

32. I split my meals into 3 main meals and 3 snacks to have meals and consistency in food intake

- a) True
- b) False

33. My meal was inclusive of rice, wheat, ragi in a solid form in different times of my meal

- a) True
- b) False

34. I always included protein rich foods in all main meals

- a) Yes
- b) No

35. I took high calorie fruits like banana, mango, grapes and sapota

- a) True
- b) False

36. I did not miss my evening snacks comprising of whole grains, legumes, germinated pulses like chana or kadala

- a) True
- b) False

37. Fibrous foods like green leafy vegetables, salads helped me in controlling my blood sugar levels

- a) True
- b) False

38. I used oil such as gingelly oil, rice bran oil, olive oil for cooking to get good type of fat for my body

- a) True
- b) False

39. I avoided sweets and sugars, fast foods, processed foods, high sodium foods and used lower fried foods to help me control my blood sugar

- a) True
- b) False

40. I had reduced intake of root vegetables like yam, potato, groundnut and also used less coconut in my cooking

- a) True
- b) False

41. I chose a variety of foods each day from all the food groups giving the nutrients necessary for a healthy pregnancy

- a) True
- b) False

42. My midmorning snacks included lemon juice/buttermilk or vegetarian or non-veg soups

- a) True
- b) False

43. I used to have a snack of brown bread with raw vegetables in between meals

- a) True
- b) False

44. I did not include iron rich foods like green leafy vegetables, eggs, liver of meat, fish or poultry

- a) True
- b) False

45. Vitamin C rich foods like guava, amla, lemon, musambi were also included in my diet

- a) True
- b) False

46. I read and used the "Nutrition fact" label in food packets to make lower calorie food choices while shopping food items to fit into a healthy meal plan

- a) True
- b) False

47. I ate smaller meals and had low calorie snacks more often to prevent myself from getting very hungry

- a) True
- b) False

48. I did not keep track of the following: blood sugar levels, food intake, physical activity, weight gain and physical wellness

- a) True
- b) False

49. I should always breastfeed my baby which is beneficial to the baby and also allows me to use extra calories stored during pregnancy

- a) True
- b) False

50. I was confident to manage GDM ( if it had occurred) rather than allowing it to manage my life


- a) True
- b) False

# APPENDIX XVIII

## E-Booklet on Lactation and Complementary Feeding


### E-NUTRITION BOOKLET (English and Malayalam Version)

### A GUIDE TO PROPER BREASTFEEDING AND WEANING PRACTICES



For More Information please contact:  
**SINDHU S.**  
PhD Research Scholar and Consultant Clinical Nutritionist  
88665419  
Email: sindhu51@gmail.com

(സംഗമം കഴിഞ്ഞ്) മുലപ്പാലം നൽകുന്നതിനും അടുത്തുള്ള കഴുപ്പുവേലകൾ നൽകുന്നതിനുമുള്ള മാർഗ്ഗരേഖ



എ സിന്ധു സിന്ധു  
പി.എച്ച്.ഡി. ഗവേഷകയും കൺസൾട്ടന്റ് ക്ലിനിക്കൽ ന്യൂട്രിഷണലിസ്റ്റും  
88665419  
Email: sindhu51@gmail.com

**T**aking care of nutritional needs, healthy partners and overall health have an overall delivery because the mother cannot produce enough breast milk to lactate. The mother depends totally on the mother's milk to be available. To ensure that the mother's milk meets the needs of the baby, the mother should take care of her own health. The mother should take care of her own health by eating a healthy diet, getting enough rest, and staying hydrated. The mother should also take care of her mental health by seeking support from family and friends.

**Complementary feeding** refers to the process of transition from breast feeding to foods other than breast milk. It is essential to start this process at the right time to ensure that the baby receives the right nutrients and energy to grow and thrive. The process of complementary feeding should be done gradually and in a way that the baby is comfortable with it. The mother should start with soft, easy-to-digest foods and gradually introduce more complex foods as the baby's digestive system matures.

**The first 1,000 days of life** is the critical period for brain development and overall health. It is essential to ensure that the baby receives the right nutrients and energy during this period. The mother should focus on providing a healthy diet, getting enough rest, and staying hydrated. The mother should also take care of her mental health by seeking support from family and friends.

**NUTRITIONAL REQUIREMENTS**

**RDA - RECOMMENDED DIETARY ALLOWANCES**

**COMPOSITION OF BREASTMILK REQUIREMENTS OF A NORMAL, SEDENTARY ADULT WOMAN AND LACTATING WOMAN**

Category	Energy		Protein		Carbohydrate		Fat		Fiber		Vitamin		Mineral	
	kcal	g	g	g	g	g	g	g	g	g	g	g	g	g
Adult female	1800	45.7	20	100	25	200	1.4	1.8	15	85				
Lactating (0-6 months)	1900	52.8	30	100	25	200	2.1	3	115					
Lactating (6-12 months)	1800	45.7	20	100	25	200	2.1	2.8	115					

**കുഞ്ഞിന്റെ പോഷക ആവശ്യങ്ങൾ** നിറവേറ്റുന്നതിനും ആരോഗ്യകരമായ മുലപ്പാലം നൽകുന്നതിനും മാതാവ് തന്റെ ആരോഗ്യം നിലനിർത്തേണ്ടതുണ്ട്. മാതാവ് തന്റെ ഭക്ഷണം ശ്രദ്ധിക്കുകയും കൂടുതൽ വിശ്രമം നേടുകയും ചെയ്യേണ്ടതുണ്ട്. മാതാവ് തന്റെ മെന്റൽ ആരോഗ്യം നിലനിർത്തുന്നതിനും സഹായം തേടേണ്ടതുണ്ട്.

**കുറേപ്പാലം നൽകൽ** മുലപ്പാലം മാത്രം നൽകുന്നതിൽനിന്നും മറ്റ് ഭക്ഷണങ്ങൾ നൽകുന്നതിലേക്ക് മാറുന്ന പ്രക്രിയയാണ്. ഇത് ശരിയായ സമയത്ത് ആരംഭിക്കേണ്ടതുണ്ട്. കുഞ്ഞിന്റെ ദഹനശേഷി കഴിവു കൂട്ടിയിടുന്നതിനും മാതാവ് തന്റെ ഭക്ഷണം ശ്രദ്ധിക്കേണ്ടതുണ്ട്.

**ആദ്യ 1,000 ദിവസം** ജീവനിലെ കൃത്യമായ കാലഘട്ടമാണ്. ഇതിനിടയിൽ കുഞ്ഞിന്റെ മനോരോഗം നിലനിർത്തുന്നതിനും മാതാവ് തന്റെ ഭക്ഷണം ശ്രദ്ധിക്കേണ്ടതുണ്ട്.

**പോഷക ആവശ്യങ്ങൾ**

**RDA - RECOMMENDED DIETARY ALLOWANCES**

**COMPOSITION OF BREASTMILK REQUIREMENTS OF A NORMAL, SEDENTARY ADULT WOMAN AND LACTATING WOMAN**

Category	Energy		Protein		Carbohydrate		Fat		Fiber		Vitamin		Mineral	
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Lactating (0-6 months)	1900	52.8	30	100	25	200	2.1	3	115					
Lactating (6-12 months)	1800	45.7	20	100	25	200	2.1	2.8	115					

**MEAL PLANNING**

- Plan your meals to address an to correct deficiencies of vitamins. A daily variety of foods is essential to ensure that the diet is balanced and provides all the nutrients that the body needs.
- Include a variety of fruits and vegetables in your diet.
- Include a variety of grains, pulses and legumes in your diet.
- Include a variety of dairy products in your diet.
- Include a variety of nuts and seeds in your diet.
- Include a variety of oils in your diet.
- Include a variety of herbs and spices in your diet.
- Include a variety of beverages in your diet.

**FOOD GROUPS**

Include whole grains which are rich in B vitamins and fiber.

Include a variety of fruits and vegetables in your diet.

Include a variety of grains, pulses and legumes in your diet.

Include a variety of dairy products in your diet.

Include a variety of nuts and seeds in your diet.

Include a variety of oils in your diet.

Include a variety of herbs and spices in your diet.

Include a variety of beverages in your diet.

**ഭക്ഷണസമയക്രമം**

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**ഭക്ഷണസമയക്രമം**

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Include a variety of dairy products in your diet.

Include a variety of nuts and seeds in your diet.

Include a variety of oils in your diet.

Include a variety of herbs and spices in your diet.

Include a variety of beverages in your diet.

**MEAT VARIETIES**

**DAIRY VARIETIES**

**COCONUT OIL AND SUNFLOWER OIL**

**COCONUT OF AND RICE BRAN OIL**

**LACTOOGUES**

**HEALTHY OILS**

**HEALTHY PROTEIN**

**HEALTHY CARBOHYDRATES**

**HEALTHY OILS**

**HEALTHY PROTEIN**

**HEALTHY CARBOHYDRATES**

**Steps to be followed while breast feeding during Covid 19**

**Guidelines for Breast Feeding**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**STAGE 1**

**STAGE 2**

**STAGE 3**

**Guidelines for Complementary feeding | Stage 3**  
8-10 months of age

After 6 months introduce soft foods that can be chewed. Chappatis and other flat breads can be made into smaller bits or vegetable based gravies. Complementary of foods should be responsive to the developmental readiness of the child or reaching chewing and swallowing. Avoid hard foods that can pose choking. Lumpy and granular foods may be introduced by about 10 months.

A balanced meal plan consisting of various food groups like cereals, pulses, vegetables, fruits and eggs can be given to the child. Avoid too much salt, sugar and spices as these foods will be larger food in the following months.

**My plate for the day, COUS & DALS**



By the time the child completes one year of age, he/she should have become familiar with almost all foods making easy transition to family diet feeding. A one year old child should eat half of what the mother eats.

Encourage the child to eat over their own by providing appropriate aids to develop individual identity. Feeding feeding, eating the child to eat, feeding and other such negative ideas during meal times should be avoided as they interfere with the development of good and proper eating habits.

Introduce cereals with only after one year of age as it is difficult to digest and may lead to indigestion or allergy.

**OTHER IMPORTANT GUIDELINES**

- Introduction of solids to the immunisation schedule should be advanced to all those starting from both 6 to 12 months of age.
- Feeding must provide the environment for positive social stimulation, feeding table etiquette, etc. Parents and care givers must ensure this for early childhood development.
- Regular monitoring of height and weight to ensure optimal growth and development is necessary from both 18 & 24 months of age.

**AGE OF 18 MONTHS**

- Introduce the importance of eating healthy for better immunity and maintenance of proper health as children are easily influenced by advertisements and eat up to high consumption of junk foods.
- It is essential that parents make their children understand the need for reducing the intake of junk foods which is one of the major causes for increasing incidence of childhood obesity.
- Ensure that a balanced diet is followed at least one hour of physical activity is done in the child.

**GUIDELINES TO BUILD IMMUNITY**

- No one food can boost immunity. A balance of all nutrients is essential for maintenance of immunity. The 'My Plate for the Day' developed by ICMR and IARI depicts the various food and their quantities required.
- For soluble vitamins, A, D, E and water soluble B vitamins and C, zinc, selenium, iron, copper, magnesium, phytochemical, proteins and essential fatty acids are some of the important nutrients required for optimal immune function and regulation. Intake of all of these groups is thus essential to obtain these nutrients. (Page No 16)
- Spices like ginger, garlic, turmeric, nutmeg, black pepper, fenugreek, cinnamon etc. are potent immune boosters as they have antioxidant and anti-inflammatory factors that help fight infections.
- Using these components in a message to clearly understand the meaning of immunomodulators in foods and their daily recommended intake levels. An annex of these can be seen here. (Page No 18)
- Proper personal hygiene, adequate rest/sleep, regular exercise and balanced meal pattern should be followed preferably for maintenance of good health and optimal immune function.

**HEALTHY AND EASY RECIPES**

**Colorful Mils**

**For 8-10 month child**  
1 cup green gram (chopped) | 2-3 ml oil  
Cook the gram and add salt for a few minutes. Blend in a blender and add to the bottle.

**For 18-24 month child**  
One banana (chopped) | 2-3 ml oil  
Cook the banana and add salt for a few minutes. Blend in a blender and add to the bottle.

**For 2-3 year child**  
1 cup banana and one banana (chopped) | 2-3 ml oil  
Cook the banana and add salt for a few minutes. Blend in a blender and add to the bottle.

**HEALTHY AND EASY RECIPES**

**Colorful Mils**

**For 8-10 month child**  
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Cook the gram and add salt for a few minutes. Blend in a blender and add to the bottle.

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**HEALTHY AND EASY RECIPES**

**Colorful Mils**

**For 8-10 month child**  
1 cup green gram (chopped) | 2-3 ml oil  
Cook the gram and add salt for a few minutes. Blend in a blender and add to the bottle.

**For 18-24 month child**  
One banana (chopped) | 2-3 ml oil  
Cook the banana and add salt for a few minutes. Blend in a blender and add to the bottle.

**For 2-3 year child**  
1 cup banana and one banana (chopped) | 2-3 ml oil  
Cook the banana and add salt for a few minutes. Blend in a blender and add to the bottle.

**In a plate and add to all babies**

**For 18-24 months**  
1 cup green gram (chopped) | 2-3 ml oil  
Cook the gram and add salt for a few minutes. Blend in a blender and add to the bottle.

**Method**  
1. Soak the dry mil and add salt for a few minutes. Blend in a blender and add to the bottle.  
2. The banana should be the same consistency as that of milk. Do not add too much water.  
3. Use a knife to remove the skin after it cools. Serve hot with chutney.

**Greengram Dosa or Chappayy Dosa (Peanut)**

**Ingredients**  
1 cup green gram whole | 1/2 tsp ginger  
2-3 green chillies | 1/2 tsp of peas  
Salt to preserve the dosa and spreading on peanuts.

**Method**  
1. Soak the green gram for 4-6 hours.  
2. Blend together the green gram, ginger, green chillies and peas with a little water to make the batter.  
3. The batter should be the same consistency as that of milk. Do not add too much water.  
4. Heat a dosa, roll it and your batter and make dosa. Serve hot with chutney.

**Sprouts salad**

**Ingredients**  
Sprinkled green gram 1 cup | Chopped carrot 1 no  
Chopped tomato 1 no | Chopped onion 1 no  
Chopped green chillies 2 nos | Chopped pepper 1 no  
Salt to taste | Chopped cucumber leaves 1 cup  
Roasted Grams/Chick 1 cup | Chopped sprouts or eggs (optional) 2 cup | Salt as desired.

**Method**  
Sprinkling Soak green gram for 8 hours. Then, drain and wash the green gram and keep it covered inside a wet cloth for 8-10 hours or until the sprouts start coming out.  
1. Drain the sprouts in a strainer for 2-3 minutes. Do not cook in water as it will leach the nutrients and it will lose its crunchiness.  
2. In a large bowl, mix all the ingredients as in the recipe above and consume immediately.

**INDIAN DIETETIC ASSOCIATION**

**Immuno Boosters in Every day Foods**

**Hydration**  
Hydration helps to reduce congestion and swelling of the nose and upper respiratory tract.

**Protein**  
Protein is vital for the body's healing & recovery.

**Antioxidants**  
Antioxidants help to reduce inflammation and oxidative stress.

**Vitamins**  
Vitamins help to boost the immune system.

**In a plate and add to all babies**

**For 18-24 months**  
1 cup green gram (chopped) | 2-3 ml oil  
Cook the gram and add salt for a few minutes. Blend in a blender and add to the bottle.

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1. Soak the dry mil and add salt for a few minutes. Blend in a blender and add to the bottle.  
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Roasted Grams/Chick 1 cup | Chopped sprouts or eggs (optional) 2 cup | Salt as desired.

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**Protein**  
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**Antioxidants**  
Antioxidants help to reduce inflammation and oxidative stress.

**Vitamins**  
Vitamins help to boost the immune system.

**VITAMINS**

**Vitamin A**  
Sources: Carrots, Sweet potatoes, Spinach, Pumpkin, Mango, Apricots, Butternut squash, Egg yolk, Liver oil.

**Vitamin B1**  
Sources: Whole grains, Legumes, Nuts, Seeds, Meat, Fish, Eggs, Dairy products.

**Vitamin B2**  
Sources: Milk, Eggs, Meat, Fish, Legumes, Nuts, Seeds, Green leafy vegetables.

**Vitamin B6**  
Sources: Chickpeas, Salmon, Tuna, Turkey, Chicken, Beef, Pork, Fish, Eggs, Dairy products.

**MINERALS - ZINC & SELENIUM**

**Zinc**  
Sources: Meat, Fish, Eggs, Dairy products, Legumes, Nuts, Seeds, Whole grains.

**Selenium**  
Sources: Brazil nuts, Tuna, Chicken, Beef, Pork, Fish, Eggs, Dairy products.

**INDIAN DIETETIC ASSOCIATION**

**IMMUNO BOOSTERS IN EVERYDAY FOODS**

**Hydration**  
Hydration helps to reduce congestion and swelling of the nose and upper respiratory tract.

**Protein**  
Protein is vital for the body's healing & recovery.

**Antioxidants**  
Antioxidants help to reduce inflammation and oxidative stress.

**Vitamins**  
Vitamins help to boost the immune system.

**VITAMINS**

**Vitamin A**  
Sources: Carrots, Sweet potatoes, Spinach, Pumpkin, Mango, Apricots, Butternut squash, Egg yolk, Liver oil.

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Sources: Whole grains, Legumes, Nuts, Seeds, Meat, Fish, Eggs, Dairy products.

**Vitamin B2**  
Sources: Milk, Eggs, Meat, Fish, Legumes, Nuts, Seeds, Green leafy vegetables.

**Vitamin B6**  
Sources: Chickpeas, Salmon, Tuna, Turkey, Chicken, Beef, Pork, Fish, Eggs, Dairy products.

**VITAMINS**

**Vitamin C**  
Sources: Citrus fruits, Strawberries, Kiwi, Pineapple, Guava, Papaya, Mango, Bell peppers, Broccoli, Cauliflower, Spinach, Kale, Brussels sprouts, Tomatoes, Onions, Garlic, Herbs.

**Vitamin E**  
Sources: Nuts, Seeds, Whole grains, Leafy green vegetables, Avocado, Olive oil.

**FIBROLYS & PROBIOTICS**

**Fibrous**  
Sources: Whole grains, Legumes, Nuts, Seeds, Fruits, Vegetables.

**Probiotics**  
Sources: Yogurt, Kefir, Sauerkraut, Kimchi, Miso, Tempeh, Fermented foods.

**INDIAN DIETETIC ASSOCIATION**

**IMMUNO BOOSTERS IN EVERYDAY FOODS**

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**Vitamin E**  
Sources: Nuts, Seeds, Whole grains, Leafy green vegetables, Avocado, Olive oil.

**VITAMINS**

**Vitamin D**  
Sources: Sunlight, Fatty fish, Egg yolk, Liver oil, Fortified milk.

**Vitamin K**  
Sources: Leafy green vegetables, Broccoli, Cauliflower, Brussels sprouts, Kale, Spinach, Herbs.

**MINERAL - CALCIUM & IRON**

**Calcium**  
Sources: Milk, Yogurt, Cheese, Tofu, Leafy green vegetables, Almonds, Sesame seeds.

**Iron**  
Sources: Meat, Fish, Eggs, Dairy products, Legumes, Nuts, Seeds, Whole grains, Leafy green vegetables.

**INDIAN DIETETIC ASSOCIATION**

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**Vitamin D**  
Sources: Sunlight, Fatty fish, Egg yolk, Liver oil, Fortified milk.

**Vitamin K**  
Sources: Leafy green vegetables, Broccoli, Cauliflower, Brussels sprouts, Kale, Spinach, Herbs.



## APPENDIX XIX

## Calculation of components of Medical Nutrition Therapy

## i. Assessment of body mass index (BMI) based on pre pregnancy weight

Using the pre-pregnancy weight and height of pregnant women, BMI calculation and categorization done using the Asian BMI Classification, WHO, 2002 as follows.

$$\text{BMI} = \frac{\text{Pre-pregnancy weight (kg)}}{(\text{Height in metre})^2}$$

Nutrition status	BMI (kg/m <sup>2</sup> )
Underweight	<18.5
Normal	18.5 – 22.9
Overweight	23 – 24.9
Obese I	25 – 29.9
Obese II	>30

## ii. Estimation of required total gestational weight gain

Based on the calculated pre-pregnancy BMI, required total weight gain recommendation can be derived from the Gestational Weight Recommendations, Institute of Medicine as follows.

Pre-pregnancy BMI category (kg/m <sup>2</sup> )	Total weight gain (kg)
Underweight	12.5 – 18
Normal	11.5 – 16
Overweight	7 – 11.5
Obese I & II	5 – 9

## iii. Expected weight for current period of gestation

Based on the category of pre-pregnancy BMI, the expected weight needed for the current period of gestation can be calculated using the Gestational Weight Recommendations, Institute of Medicine. The difference between current weight and expected weight would help to analyse the excess or deficit in weight gain at the current period of gestation.

Pre-pregnancy BMI category (kg/m <sup>2</sup> )	Total weight gain (kg)	Rate of Weight gain 2 <sup>nd</sup> and 3 <sup>rd</sup> trimester (kg/week)
Underweight	12.5 – 18	0.51
Normal	11.5 – 16	0.42
Overweight	7 – 11.5	0.28
Obese I & II	5 – 9	0.22

Expected weight for the different pre-pregnancy BMI category can be calculated as follows:  
Expected weight at current period of gestation

$$\begin{aligned} &= [\text{Current period of gestation (in weeks)} - 12 \text{ weeks of first trimester}] \times \text{Rate of weight gain corresponding to pre-pregnancy BMI} \\ &= \text{Average weight gain/week} \\ &= \text{Average weight gain/week} + \text{Pre pregnancy weight} \end{aligned}$$

**iv. Energy**

<b>Pre-pregnancy BMI category (kg/m<sup>2</sup>)</b>	<b>1<sup>st</sup> trimester (kcal/kg)</b>	<b>2<sup>nd</sup> trimester (kcal/kg)</b>	<b>3<sup>rd</sup> trimester (kcal/kg)</b>
Underweight	30	36-40	36-40
Normal	30	36	36-38
Overweight	24	24	24
Obese I &II	12-14	12-14	12-14

Total energy requirement should never go below 1500kcalories/day or 50% restriction is not recommended for increased chances of ketosis (Magon et.al, 2011)

**v. Protein**

The average protein requirement of 1.1g/kg ideal body weight is needed which is 60-70g/day (Salis, et.al 2021). An additional 9.5g protein/day in the second trimester and 22g protein/day in the third trimester is the recommendation as per RDA, ICMR-NIN,2020

**vi. Fat**

According to the RDA, ICMR-NIN 2020 guidelines, a minimum of 20-35% of energy should be contributed through fats of which 30g can be visible fat.

**vii. Carbohydrate**

Managing carbohydrate is the greatest change in managing elevated blood glucose levels. The RDA for carbohydrate is set at a minimum of 175g/day for adequate foetal growth and development. (RDA, ICMR-NIN,2020)

**viii. Dietary fibre**

Maintenance of adequacy of fibre in diet during pregnancy is essential for keeping safe limits of blood glucose levels as well as improving satiety and preventing constipation. The RDA for fibre in pregnancy is 40g/2000kcal per day.(RDA, ICMR-NIN,2020)

**ix. Other micronutrients**

All other important micronutrients needed during pregnancy such as iron, folic acid, vitamin D, iodine, vitamin C, calcium, etc needs to be met as per the RDA, ICMR\_NIN, 2020.



**Avinashilingam Institute for HomeScience and Higher Education for Women**

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Coimbatore - 641 043, Tamil Nadu, India

**Appendix L2**

**(Item No 5 of Check List) Details of  
Research Publications**

S.No	Article	Journal	Other Details Vol/No/Page No/ Year	Published in UGC- CARE / Scopus Indexed/ Web of Science
1	Medical nutrition therapy in gestational diabetes mellitus: A survey among dietitians	Journal of Diabetology	13 (3), 270-276, 2022	UGC- CARE I
2	A study on behaviour, diet patterns and physical activity among selected GDM and Non-GDM women in South India	Journal of Diabetology	Accepted status. Due for publication in January-March 2024 issue of the journal	UGC-CARE I

\*Proof of list of Journals from Internet to be attached along with copies of reprints.

Scholar : Sindhu S., 18PHFDP003, Dept of FSMD

*Sindhu*

Supervisor : Dr. S. Uma Mageshwari, Professor, Dept of FSMD

*Dr. Uma Mageshwari*

Checked By:  
*Sindhu*  
12/01/2024

HoD/Dean of Respective School

⇐

The scholar Miss. Sindhu, S (18PHFDPO03) has published/  
got acceptance in the following journal:

1. Journal of Diabetology - indexed and active in  
UGC care list Group I from June 2019 to present.

~~This may be considered.~~

J. J. J. J.  
02.01.2024.

Volume 13

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# *D*Journal of *Diabetology*

Official Journal of  
Diabetes in Asia Study Group



Editor-in-Chief  
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# Medical Nutrition Therapy in Gestational Diabetes Mellitus: A Survey among Dietitians

Sindhu S., Uma Mageshwari S.

Department of Food Service Management and Dietetics, Avinashilingam Institute for Home Science and Higher Education for Women University, Coimbatore, Tamil Nadu, India

## Abstract

**Aim:** The aim of this study was to elicit information on the perception of dietitians about gestational diabetes mellitus (GDM) and their dietetic practices. **Materials and Methods:** A survey was conducted among dietitians working in hospitals, maternity centers, and other clinics using the purposive sampling criterion. A validated questionnaire was used to obtain details about the perception of GDM, guidelines used, dietetic screening, assessment, interventions and follow-up. Descriptive statistics were reported as frequency of total number of responses for each question. Fisher's exact test on perception of GDM, operating guidelines and topics discussed in diet consultations with respect to the years of clinical experience, age group and educational qualification of the participants were performed. **Results:** Perception of dietitians on family history of type2 DM as an associated risk factor of GDM had significant association with their clinical experience. Majorly discussed topic in diet consultation was carbohydrate distribution followed by protein requirement, fiber and small frequent meal pattern. On the basis of clinical experience of dietitians, difference was observed in discussed topics such as hypoglycemia, food groups, post-natal diet, and breast feeding. A major inconsistency observed was the nonavailability or lack in the use of pregnancy specific screening tool. **Conclusion:** Specific screening tools for pregnancy should be brought into practice. There is also the need for sustainable protocols in hospitals for uniformity in management of GDM.

**Keywords:** Dietitians, gestational diabetes mellitus, MNT, perception

## INTRODUCTION

Gestational diabetes mellitus (GDM) is one of the common problems in pregnancy, posing a considerable risk on maternal and fetal health. The International Diabetes Federation (IDF) Atlas 2019 described 223 million women (20–79 years) living with diabetes globally. IDF also projected the number to increase to 343 million by 2045. According to IDF, 20 million or 16% of live births were associated with some form of hyperglycemia in pregnancy and one in six births were affected by GDM.<sup>[1]</sup> A recent study on the prevalence of GDM found significant variations in the prevalence of GDM across the different states, the socioeconomic environment, and demographic parameters. The study reported the age-adjusted prevalence of GDM to be highest in Telangana

and Kerala.<sup>[2]</sup> Unlike the usual belief that GDM is only a temporary problem for the expectant woman, which reverts to normal after delivery, there is now substantial evidence of it being a risk factor for future metabolic problems such as type 2 DM, hypertension, obesity, ischemic heart disease, and other cardiovascular diseases in both mother and the baby.<sup>[3–5]</sup> In 1979, the First International Workshop on GDM held in Chicago proposed nutritional counseling and diet therapy in the guidelines for the management of GDM.<sup>[6]</sup> Medical nutrition therapy (MNT) became the cornerstone of GDM management. Recommendations suggested that dietary management should be individualized to meet the calorie requirements

**Address for correspondence:** Ms. Sindhu S,  
Department of Food Service Management and Dietetics, Avinashilingam  
Institute for Home Science and Higher Education for Women University,  
Coimbatore, Tamil Nadu, India  
E-mail: sindhus16@gmail.com

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for maternal and fetal health while reducing the risks of hyperglycemia and ketonemia.<sup>[7]</sup> Intensive nutrition therapy based on the total amount, type, and distribution of carbohydrates consumed and self-monitoring of blood glucose are essential aspects in the management of GDM.<sup>[8]</sup> Even when most cases could be managed with diet therapy alone, evidence-based practice guidelines for GDM were not available.<sup>[8]</sup> In 2001, Diabetes Care and Education and the Women and Reproductive Nutrition practice groups of the American Dietetic Association collaborated and framed the practice guidelines for GDM to overcome the inconsistencies in the nutrition care of women with GDM. The field test studies based on the implementation of guidelines at prenatal care and other provider centers showed improvement of glucose control in women with GDM.<sup>[9]</sup> MNT still is a mainstay in the treatment of GDM<sup>[10]</sup> and dietetic interventions in the form of individualized diet consultations with a registered dietitian have been effective in improving blood glucose control, and reducing the need for insulin and also the occurrence of adverse maternal fetal outcomes in women with GDM.<sup>[11]</sup> However, diet consultation for women with GDM still exists as a major concern in many low-income settings due to the scarcity of dietitians.<sup>[12]</sup> Also, evidence lacks whether a systematic, evidence-based dietetic care of women with GDM is followed in many states across India. This study was conducted to obtain information on the perception of dietitians about GDM and the dietetic practices in the management of GDM.

## MATERIALS AND METHODS

A survey was conducted among dietitians working in hospitals, maternity centers, and private clinics in Kochi, Kerala, India using a purposive sampling criterion from March 2019 to January 2020. Institutional Human Ethics Committee approval was obtained for the study. Consenting dietitians who were willing to fill and submit a questionnaire were included in the study. The questionnaire was directly handed over or mailed to the dietitians according to their preference. The questionnaire was designed based on the structured survey tools used in Women in India with Gestational Diabetes Mellitus Strategy (WINGS-5) project<sup>[13]</sup> as well as the Gestational Diabetes Dietetic Practice Survey developed by Morrison *et al.*<sup>[14]</sup> Additional questions were incorporated based on the Diagnosis and Management of Gestational Diabetes Mellitus: Technical and Operating Guidelines developed by Ministry of Health and Family Welfare, Government of India.<sup>[15]</sup> The 47-item questionnaire included both multiple-choice and open-ended questions. Open-ended questions were used to record demographic details (6 questions), nutrition screening and assessment (6 questions), guidelines and dietetic interventions (9 questions), follow-up, and evaluation practices (10 questions). Likert scale responses were used to report perception of GDM

(8 questions) and the need for protocol-based management strategies and dietetic interventions (8 questions). The developed questionnaire was pilot tested by two dietitians, two obstetricians, two academicians and one statistician for content validation and then used as the survey tool. Statistical analysis was done using SPSS version 21. Descriptive statistics were expressed as the frequency of the total number of responses for each question in the questionnaire (%). Fisher's exact test was performed to understand the association between age group, years of clinical experience and educational qualification of the respondents with perception of GDM, operating guidelines used and topics discussed in diet consultations for GDM women.

## RESULTS

### Demographic details

A total of 55 dietitians participated in the survey, out of which 85.5% worked in multispeciality hospitals with a mean age of 33.87 (standard deviation = 7.63) years. Out of the surveyed respondents, all were full-time dietitians except one respondent who worked as a consultant clinical nutritionist. Majority of the dietitians were postgraduates, and almost half of the surveyed respondents had 5–10 years of clinical experience.

### Perception about GDM

A 5-point Likert scale on the perception of dietitians about GDM demonstrated 34.5% strongly agreeing, 63.6% agreeing, and 1.8% not knowing that GDM is on the rise. When the participants were asked about the prevalence of GDM being considered more in urban than rural areas, 20% strongly agreed, 58.2% agreed, 18.2% had a neutral opinion, and 3.6% disagreed. Half of the respondents (50.8%) strongly agreed on GDM as a risk factor for future type 2 diabetes mellitus in expectant mothers. Out of the total participants, 43.6% suggested evidence-based treatment strategies, 54.5% early diagnosis and detection of GDM, 70.9% health and nutrition education and 61.8% regular follow-up and evaluation as preventive measures to reduce the incidence of GDM at a national level. Twenty-two (40%) of the respondents also demonstrated strong agreement with the perception that normoglycemia in GDM women can be achieved through proper MNT and exercise. Fisher's exact test was performed to find the relation between associated risk factors of GDM and years of clinical experience, educational qualification and age group of the respondents. The results in Table 1 describe a significant association only between the perception of family history of diabetes mellitus as an associated risk factor for GDM and the clinical experience of respondents.

The study also assessed the confidence level among dietitians in providing dietetic advice to GDM women. The respondents were asked to rate on a scale of 1 to 4, where

**Table 1: Perception of respondents on associated risk factors of GDM and years of clinical experience**

Clinical experience	Family history of Type 2 DM		GDM in previous pregnancy		Obesity		High maternal age	
	No	Yes	No	Yes	No	Yes	No	Yes
<5 years (n = 16)	4 (25%)	12 (75%)	7 (43.3%)	9 (56.2%)	2 (12.5%)	14 (87.5%)	13 (81.3%)	3 (18.8%)
5–10 years (n = 24)	4 (16.7%)	20 (83.3%)	6 (25%)	18 (75%)	4 (16.7%)	20 (83.3%)	13 (54.2%)	11 (45.8%)
10–15 years (n = 8)	0	8 (100%)	1 (12.5%)	7 (87.5%)	0	8 (100%)	2 (25%)	6 (75%)
>15 years (n = 7)	5 (71.4%)	2 (28.6%)	3 (42.9%)	4 (57.1%)	0	7 (100%)	5 (71.4%)	2 (28.6%)
Fisher's exact value	10.016		3.278		1.759		7.533	
P Value	.012*		.353		.701		.053	

\*Indicates significance at 5% level of significance ( $P < 0.05$ )

1 represented very confident and 4 as not confident. More than half of the dietitians, 29 of 55 (52.7%), expressed their confidence level as very confident. Their level of understanding of current evidence-based guidelines in the management of GDM was also asked to be rated on a scale of 1 to 4, where 1 indicated excellent understanding and four as needing improvement. The results revealed that out of the total respondents, 8 (14.5%) confirmed they have excellent understanding, 29 (50.9%) a good understanding, 17 (30.9%) fair understanding, and 2 (3.6%) needing improvement.

### Screening and assessment of gestational diabetes mellitus

More than three-fourths of the respondents (78.2%) reported that screening of GDM was done for all pregnant women during their first visit to the hospital, whereas 16.4% confirmed screening as not being done and 5.5% expressed that they do not know if such screening was being done during the first visit. Forty-six (83.6%) dietitians stated single step blood glucose test with 75g oral glucose (Diabetes in Pregnancy Study Group of India – DIPSI guideline) as the screening test used for GDM, but only 23 (41.8%) of the respondents were able to describe the threshold value taken as cutoff for diagnosis of GDM (PPBS  $\geq 140$ mg/dL). Majority of dietitians (90.9%) also reported doing maternal nutrition assessment for all GDM women visiting their respective hospitals, whereas 5.5% reported not doing and 3.6% were not responsive. However, no screening/ assessment tools specific for pregnancy were used or available in any hospitals.

The average number of GDM women seen per month was reported to be five or less by half of the surveyed dietitians, suggesting a lack of regular dietetic referrals. Only 10 out of 55 (18.2%) dietitians reported that the department of obstetrics and gynecology in their respective hospitals had specifically assigned dietitians to provide MNT for pregnant women.

### Guidelines and dietetic interventions for gestational diabetes mellitus

Use of an operating guideline in the MNT for GDM was indicated by 49.1% of the respondents. However, 38.2% reported not using any operating guideline, 9.1% did not respond, and 3.6% expressed a lack of knowledge. When the dietitians were asked to specify the reference guideline used, only 20 out of 55 (36%) could do so, while more than half (63.6%) did not indicate any response, suggesting the low usage of specific reference guidelines.

Only 20 out of 55 (36.4%) dietitians described obstetricians, diabetologists and dietitians as the significant healthcare workers directly involved in managing GDM women. Information provided by the surveyed dietitians on the planning and implementation of MNT for GDM showed differences which may be due to many factors like lack of awareness among dietitians, non-availability of adequate resources for implementing evidence-based guidelines and lack of awareness and support from the management of the respective hospitals and also from other healthcare professionals involved in the treatment of GDM women. Only 9 out of 55 (16.4%) respondents specifically described a national or international guideline-based stepwise dietetic intervention. This included nutrition screening during the first visit, estimating body mass index based on pre-pregnancy weight, calculation of energy, protein and other nutrient requirements using the guidelines of Institute of Medicine, American Dietetic Association or Indian Dietetic Association, personalized diet counseling and regular follow-up of GDM women. More than half (67.3%) could only generalize the dietetic interventions practiced by them.

Forty-nine (89.1%) dietitians confirmed receiving a majority of diet consultations for GDM as referrals from doctors within their respective hospitals, and nearly the same number, 48 (85.7%) also reported individual diet consultation as the type of consultation done by them. Approximately 44% of the total respondents reported that they could provide two diet consultations per GDM woman throughout the entire period of gestation, as shown

in Figure 1. More than three-fourths of dietitians (78.2%) also described taking 30 min to 1 h for diet consultations per GDM client.

The surveyed dietitians were also asked to specify ten major topics from a group of twenty possible topics discussed while providing diet consultations to GDM women [Figure 2]. The topics found to be less discussed

were food groups (45.5%), self-monitoring of blood glucose (45.5%), review visit requirement (43.6%), salt and fluid intake (36.4%), diet during lactation (30.9%), breastfeeding (29.1%), low-calorie foods (29.1%), food label reading (27.3%) food safety (25.5%), postprandial blood glucose target level (23.6%), and use of artificial sweeteners (10.9%).

Fisher's exact test on major topics discussed during diet consultation for GDM women based on years of clinical experience, educational qualification, and age group of the respondents showed that there was a significant association with respect to years of clinical experience and the inclusion of topics such as hypoglycemia, food groups, postnatal diet, and breastfeeding in their consultations [Table 2]. No association was observed between the other groups.

### Outcomes, follow-up and evaluation for gestational diabetes mellitus

Of the total surveyed respondents, 70.9% stated assisted labor, 61.8% miscarriage or stillbirth, 49.1%

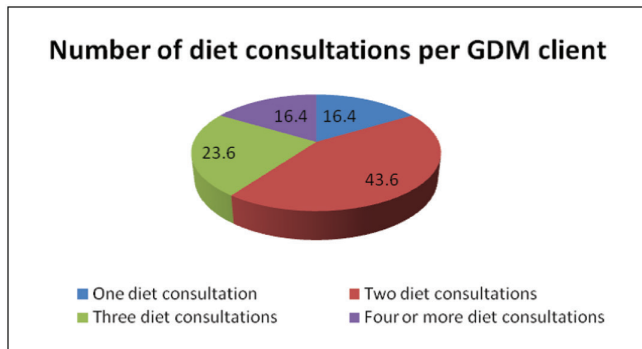


Figure 1: Number of diet consultations per GDM woman throughout the period of pregnancy

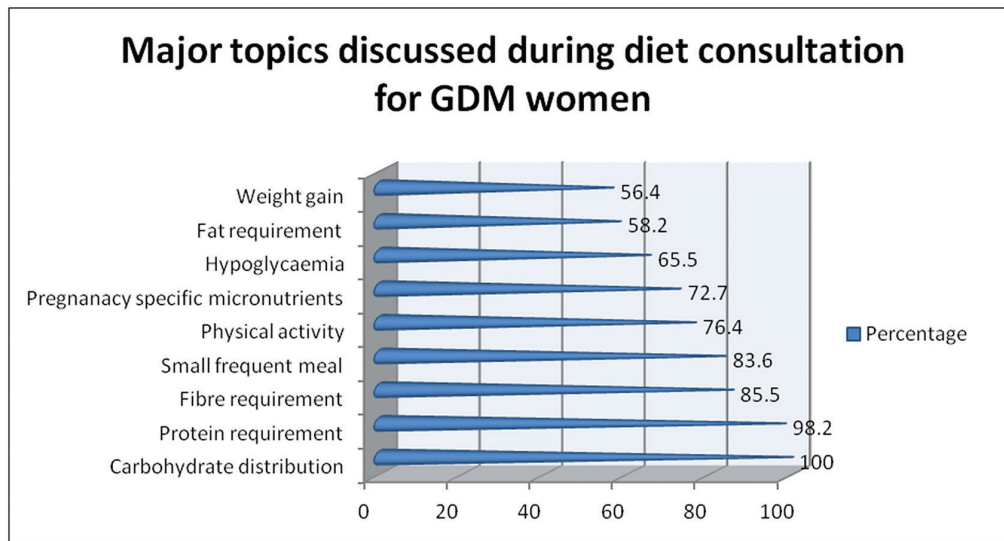
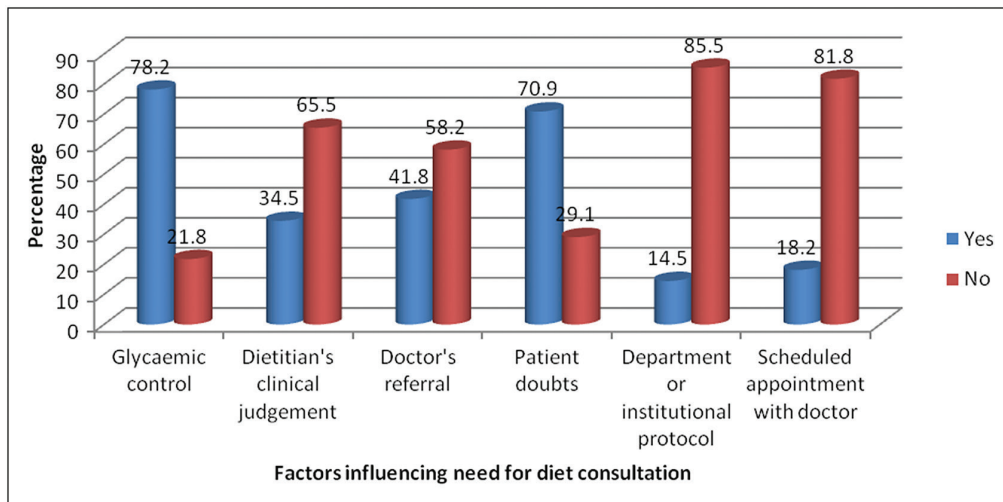


Figure 2: Major topics discussed during diet consultations for GDM women

Clinical experience	Hypoglycemia		Food groups		Post natal diet		Breastfeeding	
	Yes	No	Yes	No	Yes	No	Yes	No
<5 years (n = 16)	9 (56.3%)	7 (43.8%)	4 (25%)	12 (75%)	7 (43.8%)	9 (56.3%)	2 (12.5%)	14 (87.5%)
5–10 years (n = 24)	20 (83.3%)	4 (16.7%)	10 (41.7%)	14 (58.3%)	10 (41.7%)	14 (58.3%)	12 (50%)	12 (50%)
10–15 years (n = 8)	5 (62.5%)	3 (37.5%)	4 (50%)	4 (50%)	0	8 (100%)	0	8 (100%)
>15 years (n = 7)	2 (28.6%)	5 (71.4%)	7 (100%)	0	0	7 (100%)	2 (28.6%)	5 (71.4%)
Fisher's exact value	8.142		11.544		9.190		10.016	
P Value	.035*		.008*		.018*		.011*	

\*Indicates significance at 5% level of significance ( $P < 0.05$ )



**Figure 3:** Factors influencing the need for diet consultations for GDM women

polyhydramnios or oligohydramnios, and 40% prolonged labor as the commonly seen maternal problems in GDM. The fetal problems reported by more than half (87.3%) of the respondents were excessive weight gain followed by neonatal hypoglycemia (63.6%) and spontaneous abortion (50.9%). Obesity was described as the major future risk for children born to GDM mothers by 39 of 55 (70.9%) respondents. The other prominent risks suggested by the respondents were type 2 diabetes mellitus in childhood or adolescence and glucose intolerance.

Just above half (50.9%) of the surveyed dietitians reported that full compliance to dietetic advice was observed among GDM women who consulted them. Partial compliance was reported by around 40% of the participants. The possible reasons for this according to their shared experience were lack of awareness among GDM women regarding the importance of MNT in the management of GDM, inability to follow diet restrictions due to increased food cravings and appetite and lack of time management, especially among working women with GDM. Out of the total surveyed participants, 40% also reported partial compliance among GDM women for regular dietetic follow-up and evaluation after delivery. The reason for this was attributed to the blood sugar levels reverting to normal in most GDM women after delivery. Thirty (54.5%) dietitians reported nutrition evaluation being done for all children born to GDM women. The other 25 (45.45%) dietitians reported not doing nutrition evaluation. Eight dietitians also reported that nutrition evaluation of children born to GDM women was performed only upon receiving referrals from doctors or in conditions such as preterm birth, small for gestational age, large for gestational age, and hyperglycemia in the newborn.

**Perception of protocol-based dietetic management**

There was strong agreement among respondents for protocol-based management strategies such as

multidisciplinary approach (72.7%), use of evidence-based guidelines (58.2%), development of standard operating protocols (40%), continuous training of healthcare professionals (58.2%), interdisciplinary rounds and clinical audits (38.2%), and proper documentation (78.2%) conforming to set quality standards. Almost half of the respondents (49.1%) agreed, and 32.7% strongly agreed to a protocol-based flowchart for effective planning of MNT for GDM women. When the surveyed dietitians were asked to describe the factors that influenced the need for diet consultations, 78.2% reported glycemic control as the primary factor. Their responses to other factors are illustrated in Figure 3.

**DISCUSSION**

The study attempted at understanding the perception of GDM and its dietetic interventions among dietitians. The study results reveal that more than half of the surveyed dietitians agreed that GDM is on the rise and that the incidence is more in urban than rural areas. Half of the participants strongly agreed that GDM is a risk factor for future type 2 diabetes among GDM women. They were also in strong agreement for improved management strategies like multidisciplinary approach (72.7%), use of evidence-based guidelines (58.2%), development of standard operating protocols (40%), continuous training of healthcare professionals (58.2%), interdisciplinary rounds and clinical audits (38.2%), and proper documentation (78.2%) conforming to set quality standards.

The study also helped identify some inconsistencies in the management of GDM across the surveyed hospitals. Almost one-third of dietitians were unsure of screening techniques used at their place of work. The dietitians who reported the screening as being done confirmed that a general nutrition screening tool was used for this purpose instead of a pregnancy-specific screening tool.

The current screening tool used in the surveyed hospitals was also found to be inconsistent in identifying pregnant women who are at risk of developing GDM.

More than half (63.6%) of the surveyed dietitians did not specify the operating guideline used in MNT, suggesting the low usage of specific reference guidelines. The number of dietetic consultations done by a dietitian per month and the number of dietetic consultations given per client indicated the lack of regular referrals to dietitians. This is contrary to the national and international guidelines, which emphasize MNT as one of the primary interventions required in the treatment and management of GDM.<sup>[16,17]</sup> This implies that not all pregnant women visiting the surveyed hospitals get access to proper dietetic advice on GDM. Proper MNT for GDM has proved in many studies as being beneficial in improving maternal and fetal outcomes.<sup>[18-20]</sup>

The diet consultations done by dietitians were found to be covering a large number of topics, but topics like gestational weight gain pattern, self-monitoring of blood glucose, setting target levels for postprandial blood glucose, and the need for review visits were found to be less discussed. These interventions have been reported to serve as effective strategies in attaining good glycemic control in GDM women, thereby maintaining maternal and fetal health.<sup>[21,22]</sup>

### Limitations

The study had a small sample size and it was conducted in one geographical region of the country. Results cannot be thus generalized for the entire county. Further large multicentric countrywide research may be taken up to understand the existing dietetic practices for GDM all over India. This would help to arrive at more concrete conclusions and facilitate the development of sustainable protocols for improved dietetic management of GDM.

### CONCLUSION

The study strongly recommends the need for a pregnancy-specific nutrition screening tool to identify those at risk of GDM. It also suggests ensuring systematic referrals to the dietitian for MNT of GDM women and educating and training dietitians in adopting evidence-based national or international guidelines for providing uniform, optimal and consistent care for all pregnant women for the prevention and management of GDM.

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### Conflicts of interest

There are no conflicts of interest

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# A Study on Behavior, Diet Patterns and Physical Activity among Selected GDM and Non-GDM Women in South India

S. Sindhu, S. Uma Mageshwari

Department of Food Service Management and Dietetics, Avinashilingam Institute for Home Science and Higher Education for Women University, Coimbatore, Tamil Nadu, India

## Abstract

**Aim:** Our aim is to study the behavior, diet, and physical activity patterns among gestational diabetes mellitus (GDM) and non-GDM women. **Materials and Methods:** A survey was conducted among GDM and non-GDM women from multispecialty hospitals and maternal clinics using a purposive sampling criterion. A validated interview schedule was used to obtain details of readiness for pregnancy, perception of managing pregnancy, concerns in pregnancy, degree of depression, food preferences, shopping of food, eating out, cooking, current nutrient intake, food consumption pattern, type, duration and frequency of physical activity, and rest periods of GDM and non-GDM women. **Results:** Majority of GDM and non-GDM women showed readiness for motherhood. GDM women exhibited greater confidence and importance toward making lifestyle changes during pregnancy. The pregnancy-related concerns were more common among GDM women. The mean energy and protein intake was lower than the recommended dietary allowance (RDA) among GDM women compared to their counterparts. On the contrary, carbohydrate consumption exceeded RDA among both groups. The total fat intake, including visible and invisible fat among GDM women, met the RDA; however, it exceeded the RDA among non-GDM women. The RDA for calcium, iron, and fiber showed significant difference compared to RDA among both groups. Physical activity patterns did not show any significant difference among GDM and non-GDM women and were unsatisfactory in both groups. **Conclusion:** The study recommends the need for psychological support, proper medical nutrition therapy, and adequate physical activity for GDM and non-GDM women.

**Keywords:** Behavior, diet, gestational diabetes mellitus, physical activity, GDM women

## INTRODUCTION

Pregnancy is a unique process wherein immense changes occur in a woman's body in relation to the increasing demand of the growing fetus. The complexities of these processes make this period a critical time to ensure optimum care for the pregnant woman for safe maternal and fetal outcomes. The readiness for pregnancy influences positive behavior and lifestyle patterns, aiding in safe pregnancy outcomes. Women, hence, should avoid behaviors that may risk pregnancy and adopt healthy behaviors such as healthy eating, adequate physical activity, and abstinence from alcohol, tobacco, and caffeine.<sup>[1]</sup> Further recommendations for health behavior include using folic acid and vitamin supplements, maintaining a normal

body mass index, regular sleep pattern, undergoing screening tests, preparation for birth management, and self-surveillance for symptoms such as depression, pre-eclampsia, and active labor.<sup>[2,3]</sup> Adequate nutrition during pregnancy is fundamental as the body requires a balance of all nutrients for the growing fetus and the mother. Ensuring the adequacy of the nutritional status of women during their preconception period should be the norm, unlike only during pregnancy, as the women's health during the preconception period directly influences the future outcomes of pregnancy. Lang *et al.*<sup>[4]</sup> recommend

**Address for correspondence:** Ms. S Sindhu,

Department of Food Service Management and Dietetics, Avinashilingam Institute for Home Science and Higher Education for Women University, Coimbatore 641043, Tamil Nadu, India.

E-mail: sindhus16@gmail.com

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mean age of GDM women was  $30.59 \pm 4.57$  years, and non-GDM women were  $29.56 \pm 4.13$  years, respectively. The period of gestation and the delivery status of the study participants at the end of the study period significantly varied between the groups. Table 1 describes the Chi-square analysis of the demographic profile of the study participants.

**Behavior patterns**

A majority of 92.6% of non-GDM women and 89.6% of GDM women stated that their current pregnancy was planned, suggesting their readiness for motherhood. The study assessed the importance of making changes in lifestyle to manage pregnancy and the confidence level in adopting these lifestyle changes among GDM and non-GDM women. Table 2 shows the *t* test results between GDM and non-GDM women concerning their perception of making lifestyle changes to manage pregnancy and their confidence level in adopting lifestyle changes in pregnancy.

The mean scores for the importance of making changes in lifestyle to manage pregnancy and the

confidence level for adopting these lifestyle changes were significantly greater for GDM women compared to non-GDM women, indicating that GDM women had a better perception toward making changes to manage pregnancy as well as greater confidence to adopt these changes.

It was also seen that 96.2% of GDM and 40.7% of non-GDM had some concerns during pregnancy. Fisher’s exact test conducted on the presence and absence of worries or concerns among GDM and non-GDM women showed significant difference, with GDM women being more affected than non-GDM women. Growth of the fetus, complications, and pregnancy outcome were the main concerns described by 57.5% of GDM women compared to 37% in non-GDM women. Out of the total participants, 77.5% of GDM and 83.3% of non-GDM stated family as their support system in moments of stress, anxiety, and other emotional problems.

The results of BDI scores of GDM and non-GDM women revealed that although the mean BDI scores were significantly higher among GDM women compared to

**Table 1: Demographic characteristics of study participants**

Variables	GDM women (N = 106)		Non-GDM women (N = 54)		X <sup>2</sup> value	P value
	N	%	N	%		
<i>Education</i>						
Plus two	15	14.2	7	13	2.179	0.336**
Graduate	60	56.6	25	46.3		
Post graduate	31	29.2	22	40.7		
<i>Employment</i>						
Working	38	35.8	22	40.7	0.546	0.546**
Not working	68	64.2	32	59.3		
<i>Gravidity</i>						
Primigravida	46	43.4	23	42.6	0.009	0.923**
Multigravida	60	56.6	31	57.4		
<i>Period of gestation</i>						
Second trimester	66	62.3	8	14.8	32.400	<0.001*
Third trimester	40	37.7	46	85.2		
<i>Delivery status at end of study period</i>						
Delivered	36	34	48	88.9	43.281	<0.001*
Not delivered	70	66	6	11.1		

\*Significant at 1% level

\*\*Not significant

GDM = gestational diabetes mellitus

**Table 2: Perception of GDM and non-GDM women toward managing pregnancy**

Variables	GDM women (N = 106)	Non-GDM women (N = 54)	t value	P value
	Mean score ± SD	Mean score ± SD		
Importance of making changes in lifestyle to manage pregnancy	9.08 ± 0.68	8.72 ± 0.81	-2.992	0.003*
Confidence level in adopting lifestyle changes in pregnancy	8.40 ± 0.90	7.76 ± 0.99	-4.088	<0.001*

\*Significant at 1% level

GDM = gestational diabetes mellitus, SD = standard deviation

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non-GDM women, the scores were found to be within the normal range of the BDI scale. The marked differences in scores are suggestive that GDM women have a greater susceptibility to depression than their counterparts.

Table 3 represents the *t* test done to compare the mean BDI scores among GDM and non-GDM women as well as the frequency distribution of the levels of depression according to the scores namely normal, mild mood disturbance, borderline clinical depression, and moderate depression among the groups. The presence of borderline clinical depression and moderate depression were found only in GDM women compared to non-GDM women.

**Diet patterns**

**Food habits**

Most participants were non-vegetarians, with 79.2% in the GDM group and 75.9% in the non-GDM group. Table 4

presents the comparison of food habits among GDM and non-GDM women. The participants' responses regarding shopping and cooking their food, awareness of reading food labels, and frequency of eating out did not show significant difference between groups. This suggests a general lower inclination, regardless of the group, toward reading of food labels, shopping, and cooking their own food.

Eating out frequency of once per week exclusively seen within each group was 33.3% in non-GDM group compared to 17% in GDM group, whereas the eating out frequency for once or twice per month within each group was 33% in non-GDM and 36.8% in GDM group. The individual group frequencies indicate that more women in the non-GDM group tend to eat out weekly, while more women in the GDM group eat out only once or twice a month. Similarly, within groups, rare or no eating out pattern was

**Table 3: Comparison of BDI scores and levels of depression between GDM and non-GDM women**

Group	N	BDI score	SD	t value	P value
GDM women	106	9.01	4.67	-3.348	0.001*
Non-GDM women	54	6.59	3.51		
Levels of depression and corresponding BDI scores		GDM women		Non-GDM women	
		N	%	N	%
These ups and downs are considered normal (1-10)		67	63.2	44	81.5
Mild mood disturbance (11-16)		34	32.1	10	18.5
Borderline clinical depression (17-20)		3	2.8	Nil	Nil
Moderate depression (21-30)		1	0.9	Nil	Nil
Severe depression (31-40)		1	0.9	Nil	Nil

\*Significant at 1% level

GDM = gestational diabetes mellitus, BDI = Beck's Depression Inventory, SD = standard deviation

**Table 4 : Comparison of food habits among study participants**

Variables	GDM women (N = 106)		Non-GDM women (N = 54)		Total study participants (160)		χ <sup>2</sup> value	P value
	N	%	N	%	N	%		
<i>Food preference</i>								
Vegetarian	22	20.8	13	24.1	35	21.9	0.231*	0.631
Non-vegetarian	84	79.2	41	75.9	125	78.1		
Shop your own food	36	34	27	50	63	39.4	3.855*	0.050
Cook your own food	40	37.7	29	53.7	69	43.1	3.719*	0.054
Read food labels	26	24.5	20	37	46	28.8	2.733*	0.098
<i>Eating out pattern</i>								
2-4 times per week	7	6.6	4	7.4	11	6.9	8.171 <sup>a</sup>	0.082 <sup>a</sup>
Once per week	18	17	18	33.3	36	22.5		
Once or twice per month	39	36.8	18	33.3	57	35.6		
Rarely	30	28.3	7	13	37	23.1		
Never	12	11.3	7	13	19	11.9		

<sup>a</sup>Fishers exact test (one cell has expected count < 5)

\*Not significant

GDM = gestational diabetes mellitus

28.3% and 11.3% in GDM group and 13% in both rare or no eating out pattern in non-GDM women. These results suggest that within each individual group, women in GDM group had a lower frequency of eating out.

**Mean nutrient intake**

The mean nutrient intake of GDM and non-GDM compared with the recommended dietary allowance (RDA) by ICMR 2020 is depicted in Table 5.

The mean energy intake was slightly lower than the RDA in GDM women with a 0.65 deficit, whereas there was a 12% excess in the case of non-GDM women. Also, the total calories consumed by GDM women were found to be lesser than non-GDM women. This may be due to their calorie restriction for effective blood glucose control. However, carbohydrate intake was found to be excess in both groups, with 46% excess for GDM women and 72% excess in non-GDM women. Protein intake was significantly lower in the GDM group, with a deficit of 11% compared to only a minor deficit of 2% in non-GDM women. Fat consumption showed only a marginal deficit of 0.004% among GDM women; however, it was in excess by 8% in non-GDM women. Calcium and iron, two essential minerals needed in pregnancy, did not meet the

RDA. Fiber intake also was lower than RDA, with a 12% deficit in GDM and a 15% deficit in non-GDM women.

**Food frequency pattern**

The food frequency pattern showed that cereals were consumed daily by more than half of the pregnant women in both GDM and non-GDM groups [Table 6]. Both groups did not mainly consume millet such as ragi in their daily meals.

A daily intake of pulses and dals was more significant, with 74% among non-GDM women compared to 66% among GDM women. This is in concurrence with the mean protein intake analyzed in Table 5, in which non-GDM women have protein intake higher than GDM women. The intake of vegetables and fruits was consistent in both groups.

Regarding non-vegetarian foods, it was observed that about 40% of GDM and non-GDM women did not consume pork and beef in their diets; instead, they used egg, fish, and chicken.

The daily consumption of milk and milk products was found to be more or less the same, with 54% in GDM and 53% in non-GDM women.

**Table 5: Mean nutrient intake at first visit**

Nutrients	RDA	GDM women (N = 106)		Non-GDM women (N = 54)	
		Mean intake	% Excess/deficit	Mean intake	% Excess/deficit
Energy (kcal)	2010 <sup>a</sup>	1998.53***	-0.6	2251.59*	+12
Carbohydrate (g)	175	255.51*	+46	301.13*	+72
Protein (g)	75	66.38*	-11	73.42***	-2
Fat (g)	Visible fat = 30 g Total fat (20-35 en%) = 78.2 g	77.82***	-0.004	84.26*	+8
Calcium (mg)	1000	659.60*	-34	766.56*	-23
Iron (mg)	40	11.16*	-72	10.08*	-75
Fiber (g)	40	35.21*	-12	34.02*	-15

<sup>a</sup>RDA with added allowance for pregnancy—350 kcal  
 \*Significant at 1% level  
 \*\*\*Not significant  
 GDM = gestational diabetes mellitus, RDA = recommended dietary allowance

**Table 6: Food frequency pattern among GDM and non-GDM women<sup>a</sup>**

Foods	GDM women (N = 106)						Non-GDM women (N = 54)					
	D	WT	WO	MO	O	NC	D	WT	WO	MO	O	NC
Cereals	61	3	3	Nil	1	32	52	5	8	Nil	2	33
Millet	Nil	1	3	6	8	82	3	2	6	2	6	81
Pulses and dals	66	18	15	Nil	Nil	1	74	9	14	1	1	1
GLV, other vegetables and fruits	46	14	12	10	7	11	57	16	13	10	2	3
Non-vegetarian foods	12	15	16	6	11	40	15	14	19	6	5	41
Milk and milk products	54	2	4	Nil	3	37	53	6	4	Nil	6	31
Oils and fats	23	1	1	Nil	3	72	24	1	1	Nil	1	73

<sup>a</sup>All values are based on multiple responses  
 GDM = gestational diabetes mellitus, GLV = green leafy vegetables, D = daily, WT = weekly twice/thrice, WO = weekly once, MO = monthly once, O = occasionally, NC = no consumption

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**Table 7: Exercise patterns among GDM and non-GDM women**

Parameters	Responses	GDM women (N = 106)		Non-GDM women (N = 54)		X <sup>2</sup> value	P value
		N	%	N	%		
		Exercise	Walking	60	56.6		
	Duration of walking (15–30 min)	31	51.7	17	56.7	0.201 <sup>a</sup>	0.654 <sup>***</sup>
	Frequency of walking (≥five times/week)	44	72.1	26	83.9	1.557 <sup>a</sup>	0.212 <sup>***</sup>
Rest	Hours inactive during day time (5–6 h)	45	42.5	22	40.7	0.740 <sup>b</sup>	0.884 <sup>***</sup>
	Rest advised by doctor	18	17	9	16.7	0.003 <sup>a</sup>	0.960 <sup>***</sup>

<sup>a</sup>Chi-square value<sup>b</sup>Fisher's exact value<sup>\*\*\*</sup>Not significant

GDM = gestational diabetes mellitus

The type of oil seen to be commonly used among both groups was coconut oil. All other oils such as sunflower, gingelly, and olive were used sparingly, with 72% in GDM and 73% in non-GDM women.

### Physical activity

The physical activity patterns and recommendation for rest in GDM and non-GDM women did not show any significant difference for type, duration, and frequency of exercise, rest recommendation by the doctor, and the hours of inactivity, indicating that these factors remained more or less the same in both groups [Table 7]. The Asia-Pacific consensus on physical activity and exercise in pregnancy and the postpartum period by Lee *et al.*<sup>[18]</sup> recommends 150 min of moderate-intensity physical activity each week for pregnant women with no contraindications. In the present study, although 56.6% of GDM women and 33.6% of non-GDM women were engaged in walking as a form of exercise, it cannot be considered as per guidelines because it was not brisk walking and, as a result, did not come under moderate-intensity physical activity. The fear of causing harm to the developing fetus, adverse obstetric history such as miscarriage, abortion, and family pressure were some of the reasons stated by the participants who did not engage in any physical activity during their pregnancy.

## DISCUSSION

The study attempted to explore and understand the behavior, diet, and physical activity patterns among GDM and non-GDM women. Most participants from both groups reported that their current pregnancy was planned, showing their readiness for motherhood. The perception of GDM and non-GDM women on managing pregnancy significantly differed, with GDM women exhibiting greater confidence and importance toward making lifestyle changes during pregnancy. This could be associated with GDM women facing the greater challenge of modifying their diet and lifestyle toward effective glycaemic control. Davidsen *et al.*<sup>[19]</sup> also pointed out that being diagnosed

with GDM itself causes emotional disturbance in pregnant women. They are further challenged with adherence to lifestyle modifications for preventing the complications of GDM during gestation and the future risk of type 2 diabetes mellitus. It was observed that pregnancy-related concerns were more common among GDM women, such as growth of the fetus, complications, and outcome of pregnancy, compared to non-GDM women. The BDI scores were significantly different between both groups, with a greater score among GDM women than their counterparts. These findings suggest that GDM women have a greater possibility for depression compared to non-GDM women.

The preferences of GDM and non-GDM women were almost the same, with both groups preferring non-vegetarian foods over vegetarian foods. Routine activities such as shopping for food and cooking were found to be lower among both groups. Reading food labels was found to be deficient among GDM and non-GDM women, indicating their need for more awareness about the need to read food labels. Evaluation of eating-out patterns exclusively within groups showed a higher frequency of eating-out behavior among non-GDM women than among GDM women.

The food frequency pattern showed a higher consumption of wheat and a lower consumption of roots and tubers among GDM women for effective glycaemic control. Vegetable proteins such as pulses and dals were included in higher amounts among non-GDM women compared to GDM women; however, the intake of non-vegetarian foods, including eggs, remained the same among both groups. Consumption of green leafy vegetables, other vegetables, and fruits was observed to be satisfactory among GDM and non-GDM women, reflecting the importance given by both groups toward micronutrient and fiber consumption. This contradicted the study by Savita and Mageshwari,<sup>[20]</sup> which reported the mean consumption of vegetables and green leafy vegetables to be lower among gestational and pre-gestational diabetes women. Another study on eating patterns

and food consumption by pregnant women with and without GDM by Marouf and Ismail<sup>[21]</sup> reported high consumption of fruits and vegetables among both groups. Daily consumption of milk was more in both groups compared to curd intake. High calorie foods such as fruit juices and milkshakes were lower in GDM women, suggesting that they had sound awareness of restricting the intake of such foods compared to non-GDM women. The inclusion of high fat foods such as fried items, sweets, bakery items, and chaat items was also lower among the GDM women than non-GDM women, indicating that the GDM women had a better understanding of avoiding high calorie and high fat foods for controlling their blood glucose levels.

The mean energy intake was lower than RDA among GDM women compared to the excess intake observed among non-GDM women, which is associated with the calorie restriction followed by GDM women. On the contrary, carbohydrate consumption exceeded RDA among both groups. Proteins, one of the most essential nutrients needed during pregnancy, were found to be significantly lower than RDA among GDM women, whereas their counterparts had intake slightly below the RDA. The total fat intake, including visible and invisible fat among GDM women, met the RDA; however, it exceeded the RDA among non-GDM women. The calcium, iron, and fiber intake of both groups showed significant difference when compared with RDA, even when the intake of calcium rich sources such as milk and curd, fiber and iron rich sources such as green leafy vegetables were seen to be satisfactory as in Table 6. These findings indicate faulty selection and inadequate consumption of nutrient-dense food items needed for pregnancy, thereby not meeting the RDA. The results highlight the need for nutrition education among both GDM and non-GDM women.

Physical activity patterns did not show any significant difference among GDM and non-GDM women and were found to be not satisfactory in both groups. Similar results were also observed in a study by Anjana *et al.*<sup>[22]</sup> which reported that the physical activity among GDM and non-GDM women in South India was inadequate and the need for a cost-effective and culturally appropriate model of care to improve physical activity and reduce sedentary time among GDM women.

## CONCLUSION

The study recommends the need to include screening for depression for all pregnant women so that such problems can be identified early and prevented during pregnancy. There is also the need for proper nutrition education of pregnant women, aiding them in the appropriate selection of food items both in nutrient content and quantity during their gestational period.

## Limitations

The study was conducted in a metropolitan city of the country with a small sample size. Therefore, the results cannot be generalized for the entire county. More extensive countrywide research may be conducted to understand the behavior, diet, and physical activity patterns of GDM and non-GDM women across India to arrive at patient-centric holistic approaches in managing such populations.

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## Conflicts of Interest

There are no conflicts of interest.

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