# Nutritional Status of Adolescent Girls In Rural Areas of Tindivanam and Impact of Diet Counselling.

BY

M. Indira

A THESIS SUBMITTED TO THE AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN (DEEMED UNIVERSITY) COIMBATORE-641 043, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN FOOD SERVICE MANAGEMENT AND DIETETICS

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# NUTRITIONAL STATUS OF ADOLESCENT GIRLS IN RURAL AREAS OF TINDIVANAM AND IMPACT OF DIET COUNSELLING.

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APRIL, 1994

Certified as bonafide research work

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| Signature of the Head of the Department. | Signature of the Dean of the Faculty. | Signature of the Guide. |

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# INTRODUCTION

# INTRODUCTION

The period of transition from childhood to adulthood commonly called "adolescence" is a relatively short stage in the life cycle. Etymologically speaking adolescence comes from the Latin word "adolescence" which means "Maturing" or to grow up. Adolescence are the years of change of development at the biological, psychological and social level.

Adolescence makes an important phase in the development of an individual in the sense that it comprises nearly half of the growing period. Significant increase in the physical dimensions are observed during this phase. It is known that growth spurt during adolescence varies with intensity and duration from individual to individual due to several factors such as heredity, environment, socio-economic status, illness and malnutrition in the childhood etc.

Adolescence in contrast to puberty is not a single age or stage but a range of years (13-18 years) during which an individual develops from a child to an adult. These years are the most active period of life because of the double demands of activity and growth, food needs are extremely important and high (Smitha, 1988).

This is a period when girls start menstruating, get married and some of them have their first child, specially so in the rural areas. These are the years of maturation, of new social roles and

responsibilities. It is these years of passage from childhood to womanhood that a girl perhaps needs atmost of attention to enable her to be healthy and conscientious and productive in later life.

A systematic shift in energy intake occurs across the menstrual cycle. To estimate caloric needs variables such as physical activity and gender also must be considered. Girls have a peak caloric need at menarche of 2400 kilocalories followed by a slow decline to 2100 by age 16. Generally protein should provide approximately 12 to 15 percent of the total calorie intake. Carbohydrates should supply 40 to 50 percent of calorie intake (Tarasuk et al, 1991). In the adolescent female an increasing amount of fat is being stored under the skin, particularly in the abdominal area and females need increased iron due to the onset of menstruation (Karen et al, 1989). Poverty, under nutrition and neglect have a cumulative effect on the adolescent girls as reflected by their poor body size, poor growth and narrow pelvis. The physical and other deficiencies aggravate her health problems (Devadas, 1990).

One of the deficiency diseases that affects this delicate age group is iron deficiency anaemia. It is the state in which the amount of iron in the body is less than that required for normal function of haemoglobin, iron enzymes and other functioning iron compounds. The prevalence of iron deficiency anaemia varies widely depending on criteria for diagnosis, it can be affected by physiological, pathological and nutritional factors (National Research Council, 1989).

The Indian Council of Medical Research (1990) states anaemia prevalence in India to be as high as 1/8th of the entire population and to be 69.2 per cent among adolescents in south India and 68.7 per cent in North India. The prevalence of anaemia as estimated by the WHO working group in rural India (1991) is 65.3 per cent in six to fourteen years and 69.2 per cent in age group of 15 to 22 years. The general prevalence picture of anaemia as perceived by Kalpana et al (1992) in India is 38 to 72 per cent, 67 per cent in adolescents and above 70 per cent in pre school children.

The single most important cause for the widespread iron deficency anaemia in our country is inadequate iron intake in the habitual diets, coupled with poor bioavailability of dietary iron.

The reported immediate causes of iron deficiency are (a) inadequate dietary intake (b) poor absorption (c) increased requirements and (d) increased losses. The underlying causes are varied. Poor economic conditions accounts for inadequate intake and therefore less iron. Cereal based diets in countries where rice or whole meal wheat bread is the main staple, inhibit iron absorption. Ethnic differences in dietary pattern and cooking habits also affect the iron intake. High hookworm infestation rate due to lack of health facilities and poor hygienic conditions accelerate the development of iron deficiency because of increased blood losses.

The most crucial segment of our population from the point of view of our future generation is today's young girls who are just on the

threshold of marriage and motherhood. These girls are our future home makers. Their attainments and competance will be the major determinants of the health and nutrition of children of the next generation. It is precisely also this segment of our population that has been sadly neglected in all our developmental and educational programmes.

Neglect of girls is reflected in the slowly disappearing customs like preferential treatment for boys, child marriage and the resultant adolescent pregnancy, over work, malnutrition etc. Available research seems to indicate that right from birth, female children do not always get the same share of nutrition, health care, education and employment as their male counter parts. Despite preventive legislation, the age at marriage for girls, specially in rural areas has remained low though it has been increasing gradually resulting in frequent pregnancies, high fertility, low educational attainment, poor health and lack of opportunity for adequate personality development.

The school going girls from cities and having access to such sources of information as the radio, television, newspapers, magazines etc. are better informed on nutritional issues and they are in a better position regarding the availability and utilization of health facilities unlike the girls from very interior villages who neither have the information either through education and social interaction or through media like television nor accessible facilities (Ranjana Kumari, 1988).

Since nutritional problems are common among rural adolescent girls especially iron deficiency anaemia, with the interest of knowing their

food habits and nutritional status the investigator undertook this study.

The objectives of the study are to:

1. Assess the nutritional status of the rural adolescent girls.
2. Compare the nutritional status of rural working and non working adolescent girls.
3. Learn about their food pattern and dietary practices.
4. Give Diet Counselling to improve their nutritional status.

# REVIEW OF LITERATURE

## II REVIEW OF LITERATURE

The literature pertaining to the study "Nutritional status of adolescent girls in rural areas of Tindivanam and impact of diet counselling" was viewed under the following headings.

A. Physiological changes during adolescence,

B. Nutritional demands and food habits,

C. Nutritional status - yardsticks available to assess the nutritional status.

1. Socio economic and dietary survey,
2. Anthropometric measurements,
3. Clinical examination,
4. Biochemical estimation,
5. Weighment survey.

D. Iron deficiency anaemia,

E. Impact of Diet counselling.

### A. Physiological Changes during Adolescence:

Adolescence is the period of transition from childhood to adulthood and is the most critical period of development. This is the period when the growth spurt reaches its peak and is characterised by reaching adult size and many physical and psychological changes taking place due to the influence of the harmone. For rural Indian girls,

adolescence can best be defined as the period which starts with the premature end of education and ends with the premature start of pregnancy and child bearing. The "in between" years also represent an "in between" status (SAARC, 1990). The physiological changes that occur in the period of transition from childhood to adulthood includes the growth spurt, menarche, height attainment, weight gain and body composition changes (Gong et al, 1988). Growth spurt varies with intensity of duration from individual to individual (Shoba, 1989).

Puberty refers to the maturation or growing up of the entire body which starts at about 10 - 11 years for females, peaks at age 12 and is completed by age 15. During the 5 to 7 years of pubertal development, the adolescent gains about 20 per cent of adult height and 50 per cent of adult weight. Most of the body organs double in size and gain proportionately more fat (Karen et al, 1989). As the bony pelvis widens in preparation for future child bearing and subcutaneous fat increases, the size of the hips also increases (Williams, 1992).

Jicy (1992) did a study on the relationship between physical growth and nutrition status of children and youth ageing 7 - 19 years. He concluded that the coincidence rate was quite high and it was 92.47 per cent for girls. From the study conducted by Bogin et al (1992) among the school children of Ladino and Mayon in Guatemala, it was proved that there was a direct effect ofenvironment and sex on height and timing of adolescent growth. The girls gain about 15cm in height between the ages of 11.5 and 17 years.

A study to show the influence of race and nutritional status on BMR (Basal Metabolic Rate) revealed that the BMR does not change with difference in race but more than 65 per cent variation in BMR was found between nutritionally normal and undernourished girls (Spurr et al, 1992).

A study by Fong et al (1993) showed that during menstrual cycle, the dietary intake, urinary nitrogen excretion and urinary volume was affected, especially the intake of ascorbic acid, water, carbonated and sugar containing beverages was more and similar was the urinary volume. A study conducted to see the relationship between the nutritional status and menstruation showed that at any given age girls whose nutritional status was better particularly in terms of weight were more likely to have commenced menstruation and a consequency of early entry into reproduction, particularly for girls in areas where under nutrition is common, is a period of considerable nutritional stress during adolescence (Groos et al, 1992).

As girls attain puberty they go through a second spurt of growth. Nutritional deprivation at all growth stages gets compounded during the onset of puberty resulting in severe growth retardation in girl children. Teenage pregnancy interrupts the physiological growth spurt which brings a girl to her genetically determined maximum stature. With their malnourished status, small pelvis, under nutrition and over work during pregnancy these adolescent mothers run a high risk of life. Their babies are of low birth weight and suffer risk of higher mortality (Ram Kumar, 1990).

## B. Nutritional Demands And Food Habits:

Nutrient needs during adolescence are influenced by elevated amounts of estrogen and progesterone in females (Myrtle, 1990). In order to improve the working efficiency and output of the adolescent workers, adequate diet sufficient not only in calories but also protein, minerals & vitamins must be made available (Nirmala, 1985).

In terms of nutrient needs, the relationship of total calories to height is the preferred index for determining caloric needs. Daily protein recommendation is about 0.3gm/cm height; protein metabolism is particularly sensitive to caloric restriction during the adolescent growth spurt. All mineral needs increase, special attention is given to calcium, iron and zinc. Among the vitamins, thiamine, riboflavin and niacin needs are increased (Gong et al, 1988).

The requirements for calories, protein, carbohydrate and fat are best expressed in terms of growth rate and state of physiologic development, particularly of the genitals which parallel physiologic maturation better than chronologic age (Halpern, 1987).

To estimate caloric needs, variable such as physical activity and gender also must be considered. Girls have a peak caloric need at menarche of 2400 kilo calories, followed by a slow decline to 2100 kilo calories by age 16 (Newman et al, 1987).

From the study conducted by Martinez (1993) it was found that the total mean energy intake by the girls in Malaya was 2275.28 kilo calories of which protein supplied 15.20 per cent, lipids 42.48 per cent and carbohydrate 42.47 per cent. Breakfast supplied 17.0, lunch 42.5, after noon snack 12.5 and supper 26.6 per cent of daily energy intake.

National symposium cum workshop (1990) has recommended 0.87 to 0.94 gram of protein per kilo gram body weight per day for the age groups from 10 to 18 years. As suggested for adults the desirable level of visible fat intake in the case of older children and adolescent is also 20 grams per day (ICMR 1990). For adolescents about 15 per cent of the total calories in the diet should be provided from fat (Swaminathan, 1990).

The recommended iron intake for adolescent girls is set at 15 mg daily (Herbert 1990 and Guthrie 1986). Kies et al (1990) reported that dietary factors influencing iron availability were better predictors of iron status than the total iron intake.

Nordin et al (1987) reported that the premenopausal and post menopausal women showed a requirement of 500 to 700 mg/d of calcium to provide for the obligatory urinary losses of filtered calcium and to achieve positive calcium balance.

Guthrie (1986) cited that about 150mg of calcium must be retained each day to allow for the increase in bone mass. The need for thiamine, riboflavin and niacin with a major role in energy metabolism increases directly with increased calorie intake. Folacin and vitamin $B_{12}$ which are essential for DNA and RNA synthesis are needed in higher amounts when tissue synthesis is occuring rapidly. Since tissue growth involves amino acid metabolism particularly transamination to synthesise non essential amino acids, the requirement for vitamin $B_6$ is increased. Skeletal growth requires vitamin D, while the structural and functional integrity of newly formed cells depends on the availability of vitamin A, C and E.

Prasad reported (1988) that there is difficulty in diagnosing Zinc deficiency because reduced plasma or urine, zinc are not necessarily indicators of low body zinc status and plasma zinc concentration may remain normal in cases of mild zinc deficiency. Herbert (1990) proposed 6.8 n mol folate/kg (3 mg/kg) providing a range of 295 n mol/d for adolescent females. Reiter et al (1987) found that 97 per cent of black adolescent females consumed less than two thirds of the RDA for folate and 74 per cent had marginal plasma concentrations. Olson and Hodges (1987) proposed 40 mg of vitamin C for females during adolescent years.

FOOD HABITS:

From the study of Contento (1988) it was suggested that adolescents are not a monolithic group with respect to influences on their food choices and that it would be beneficial to match nutrition education strategies with an individual's orientation based on food choice motivational factors. Galan Munoz (1993) reported that girls were more likely to take diets low in energy than did boys. Intake of hamburgers and sandwiches was high and could be reduced for health reasons whereas that of fish was low and might well be increased for the same reasons. Vegetables were eaten frequently but fresh fruits was seldom taken. Intake of nuts, bakery products.soft drinks and alcoholic beverages was high. The NNMB report of recent surveys on diet and nutrition status of rural adolescent population showed the result that the intake of cereals and millets was found to be above the recommended intake while that of the other food groups was lower. Anderson (1991) cited that the problem areas of adolescent nutrition including the extremes of obesity and under nutrition as reflected by anorexia nervosa are particularly related to eating behaviours.

## C. Nutritional Status Yardsticks Available to Assess The Nutritional Status:

### 1. Socio Economic and Dietary Survey:

Diet surveys constitute an essential part of any complete

study of nutritional status of individuals or groups providing essential information on nutrient intake levels, sources of nutrients, food habits and attitudes. Diet surveys of communities will yield data regarding the extent of dietary deficiencies and the quantity and type of foods required for overcoming them. The surveys will also yield information regarding the economic and social factors influencing food production consumption (Swaminathan, 1990). Pore (1985) reported two most striking peculiarities of the poor Indian diets (a) The preponderance of cereals and (b) A marked deficiency of protective food stuffs. Both of these features are common in the diets of poor irrespective of which part of the country they live in or belong to.

## 2. Anthropometric Measurements:

Nutritional anthropometry is concerned with the measurements of variations in the physical dimensions and the gross composition of the human body at different ages, degree of nutrition. The height and weight are the best anthropometric trails to determine the growth pattern of a subject particularly of a specific population group. Weight is the easiest measurement to investigate and it gives the over all index of the body mass (Jelliffe 1966).

From the study of Qamra *et al* (1990) it was reported that the four body measurements weight, height, triceps and midarm

circumference were more suitable for determining the nutritional status of preadolescent, adolescent and post adolescent girls.

### 3. Clinical Examination:

Clinical examination is the most important part of nutritional assessment as we get direct information of the signs and symptoms of dietary dificiencies prevalent among the people. With a view to minimising errors in clinical assessment in Nutrition Advisory Committee of the Indian Counsil of Medical Research evolved a score card for assessing the various clinical signs and symptoms. This score card has been widely used in India in all nutrition surveys and has proved useful in assessing the improvement in nutritional status brought about by food supplements (Swaminathan, 1990). This method of assessment based on the recognition of certain physical signs has the advantage of relative inexpensiveness as neither elaborate field equipment nor a costly laboratory is needed (Jelliffe, 1966).

### 4. Bio-Chemical Estimation:

With some bio-chemical tests, deficiencies or excesses can be detected before symptoms are apparent, this making it possible to institute nutritional corrections early. Some bio chemical determinations also help to confirm clinical and

dietary data so that a diagnosis can be made and nutritional care can be planned and implemented (Robinson, 1986).

5. **Weighment Survey**:

Swaminathan (1990) cited that weighment survey has been practiced by majority of the workers in India and has been proved to be a more reliable method of survey than others. The investigator has to stay in the village or at a place close by, so that he can be present to weigh the foods personally or check the weighment of raw foods immediately before cooking.

D. **Iron Deficiency Anaemia**:

Anaemia is a syndrome characterised by a deficiency in the oxygen carrying capacity of the blood related to a decrease in haemoglobin, red blood cell volume and red blood cell number. Anaemia is a condition in which there is a diminished oxygen carrying capacity of the blood as a result of a reduction in the total circulating Hb and or a reduction in the red cell mass (Antia, 1989). Nutritional anaemias occur when one or more of the nutrients necessary for red blood cell production are dificient lack of iron, vitamin $B_{12}$ and folic acid are the most common causes of nutritional anaemias (Susan G. Dudek, 1987). Anaemia in our country is essentially due to iron deficiency although folate dificiency

also plays a part (Gopalan et al, 1989).

Iron deficiency anaemia is an anaemia due to inadequate intake of iron and it is characterised by the production of smaller, thinner red blood cells that are deficient in heamoglobin (Halpern, 1987). It is a widely prevalent nutritional problem in the world today affecting over seven million people (Neelam Bhatia, 1992).

Iron deficiency progresses in 3 stages (1) iron stores in the bone marrow, liver and spleen are depleted (2) erythropoiesis diminishes as the iron supply to the erythroid marrow is reduced and (3) heamoglobin production falls, resulting in anaemic (Sherman, 1991). The development of iron deficiency could have the causes such as inadequate diet, poor absorption, iron requirements, blood loss and infection (Vichai Tanphaichitr, 1984).

Dallman et al (1988) reported that inflammation plays role as a cause of anaemia and has important implications for the clinical evaluation of anaemic patients and for the determination of the prevalence of iron deficiency anaemia. From the study conducted by Hamdaoui et al (1993) it was reported that iron deficiency anaemia to be presented in 67 per cent of girls and 65 per cent of boys. Mean iron intake seemed to be adequate for the boys but was below recommended value for the girls. Some girls lose more than 80ml per

period and this means about 11 per cent of girls, have an increased incidence of iron deficiency anaemia (Howard, 1981). The density of iron per unit of energy seems low, showing the difficulty of covering iron requirements in relation to energy intake in regard with Tunisian diet (Hamdaoui et al, 1993).

From puberty to menopause, a woman's iron requirement is greater than that of a man. Hence her vulnerability to anaemia is greater. Symptoms of iron deficiency anaemia include pallor, weakness, fatique, dyspnea, palpitations, reduced capacity to thermo regulate, parasthesia and a reduced capacity of work (Indian Express, 1993).

Iron deficiency anaemia affects the physical capacity by reducing the availability of oxygen to the tissues which in turn affects cardiac out put and the heart eventually leading to death in severe cases (Vijayalakshmi et al, 1983).

## E. Impact of Diet Counselling:

Nutritionists facilitate client's quests for healthier lives. Dietary change is more likely when clients are actively involved, learn skills for management of dietary habits and begin to take responsibilities (Warpeha and Harris, 1993).

A composite definition may be that diet counselling is the total process of providing individualised guidance so that the client acquires the ability to self manage his/her own nutrition care that is successfully affect bahaviour change that results in more healthful behaviours (Mason et al, 1982).

A study was conducted to examine the effects of a change in education method on learning among students enrolled in a coordinated undergraduate programme. Results indicated that the students learnt effectively. They significantly increased their awareness listening and understanding during the treatment period (Lowenstein et al, 1986).

Students have been a motivating force in encouraging nutrition teaching and in the formation of a task force to review nutrition education in the medical curriculam (Warden, 1992).

Successful nutrition counselling cultivates when a client develops a sound working knowledge and practice of good health bahaviours, compatible with his/her capabilities and environment. Attainment of that goal requires the co-operation and above participation of both the nutritional counsellor and the client (Vickery and Hodges, 1986).

# METHODOLOGY

## III METHODOLOGY

The methodology involved in eliciting the "Nutritional status of adolescent girls in rural areas of Tindivanam and impact of diet counselling" is carried out under the following headings.

A. Selection of the area and samples,
B. Assessment of the nutritional status of the rural adolescent girls.
    1. Formulation of the schedule,
    2. Collection of data,
    3. Clinical examination,
    4. Anthropometric measurements,
    5. Food and nutrient intake,
    6. Biochemical assessment and
C. Diet Counselling.

### A. Selection of the area and samples:

The rural areas near the town, Tindivanam were selected for the study because no research study was under taken in this area among adolescent population and also the investigator is familiar with the area of study. The study was conducted in few rural areas in which the people were willing to extend their full co-operation.

According to Srivatsava et al (1985) a sample is a fraction of a population drawn by using a suitable method so that it can be regarded as representative of the entire population. A total number of 120 girls of 13 - 15 years age from 120 families were selected by convenience sampling method. The samples were equally derived from both working and nonworking groups of each 60. Convenience sampling method is also called as chunk method. A chunk refers to that fraction of the population being investigated which is selected neither by probability nor by judgement but by convenience (Gupta, 1991).

Eighteen subsamples from each group who were found to be anaemic by clinical examination were selected for weighment survey, biochemical assessment and to give diet counselling.

## B. Assessment of the nutritional status of the rural adolescent girls:

The nutritional status of the rural adolescent girls were assessed through the socio economic and dietary survey, food and nutrient intake, clinical examination, biochemical assessment and anthropometric measurements.

### 1. Formulation of the Schedule:

According to Satyanarayana (1984) a schedule refers to a

form of questionaire which is generally filled in by the researcher or the interviewer himself. He sits with the informant face to face and fills in the form.

Since the objective of the study was to assess the nutritional status of rural adolescent girls, a specially designed schedule (Appendix I) was developed to collect the

a. Background information,
   Information regarding
b. Dietary pattern,
c. Food taboos and beliefs,
d. Foods given during special occassions and during specific diseased conditions and information regarding the
e. Presence of anaemia.

## 2. Collection of data:

As the investigator is well known to the selected rural areas, there was no problem in establishing the rapport with the rural people. The investigator visited the selected houses and interviewed the head of the family and the adolescent girls and gathered required information. The investigator personally observed the environment to check the reliability.

3. **Clinical examination:**

According to Jelliffe (1966) clilnical examination has always been and remains an important practical method for assessing the nutritional status of a community.

Clinical examination was conducted by the investigator with the help of a physician (Plate I) using a Schedule given in Appendix II.

4. **Anthropometric measurements:**

Jelliffe (1966) stresses that height and weight are the best anthropometric traits to determine the growth pattern of a subject, particularly of a specific population group.

Anthropometric measurements such as heights and weights of the girls were recorded. Weight was recorded using a spring balance assessing the accuracy periodically (Plate II). The height was taken by using fibre glass tape.

5. **Food And Nutrient Intake:**

According to Swaminathan (1990) this method of nutritional assessment has been practiced by majority of the workers in India. By far this has proved to be a more reliable method of survey than others.

PLATE I CLINICAL EXAMINATION BY THE PHYSICIAN.

PLATE II RECORDING OF WEIGHT.

A weighment survey was conducted for the subsamples by food weighment method in which the raw foods used for each meal was weighed before cooking and the weight of the cooked food was found out. The amount of food consumed by the selected samples were found out and the raw equivalents were calculated for computing the calorie, protein, fat, calcium, iron, Beta carotene, thiamine, riboflavin, and vitamin C. The survey was conducted for 3 consecutive days and the average was taken and compared with the values by ICMR (1989). The food consumption of the rural adolescent girls was elicited using the schedule given in Appendix III.

## 6. Biochemical Assessment:

Variations in the intake of different nutrients present in the diet are reflected by changes in the concentration of the corresponding nutrients or metabolites influenced by the nutrients in blood, tissues and in urine (Swaminathan, 1990). Haemoglobin level is a useful index of the overall nutritional status irrespective of its significance in anaemia (Park and Park, 1991).

Blood samples were collected from the sub samples by the Finger prick method. The haemoglobin content was estimated using the cyanmethaemoglobin method. The procedure followed is given in Appendix V.

C. Diet Counselling:

According to Robinson (1986) dietary counselling is the process where by, people are helped to deal with their dietary and nutritional problems. The goal of the counselling is to bring about a desirable change in food behaviour.

Diet counselling was given to all the subsamples for a period of one week. Diet counselling was conducted with the help of charts, demonstrations and group discussions. Before diet counselling a questionaire was designed by the investigator (given in the Appendix V) to find out whether the adolescent girls (Subsamples 36) were aware of the nutritional facts. The impact of diet counselling was assessed through the same questionaire (Plate III).

PLATE III GIVING DIET COUNSELLING.

# RESULTS AND DISCUSSION

## RESULTS AND DISCUSSION

The results and discussion of the study "Nutritional status of the adolescent girls in rural areas of Tindivanam and impact of diet counselling" are presented and discussed under the following headings.

A. Background information of the target families of the adolescent girls
B. Food pattern and Dietary practices of the target families of the adolescent girls
C. Comparison of the nutritional status of working and non working adolescent girls and
D. Impact of diet counselling

### A. Background information of the target families of the adolescent girls:

One hundred and twenty working and nonworking adolescent girls from one hundred and twenty families were selected to investigate the socio economic conditions of their families. All the families belonged to Hindu religion only.

Out of one hundred and twenty families surveyed 90 per cent were nuclear families and the remaining 10 per cent were joint families.

1. FAMILY SIZE:

Table I gives the family size of the selected families.

TABLE I

FAMILY SIZE OF THE SELECTED FAMILIES N = 120.

| Number of family members | Number of families | Percentage of families |
|---|---|---|
| 1 - 3 | 5 | 4.2 |
| 4 - 6 | 103 | 85.8 |
| 7 - 9 | 11 | 9.2 |
| 10 and above | 1 | 0.8 |

Family size is one of the factors which affects the nutritional status of a person. From the above Table it is seen that 85.8 per cent of the families had members ranging from 4 - 6 in number. In 4.2 per cent and 9.2 per cent of the families there were members ranging from 1 - 3 and 7 - 9 respectively. Ten and above were found only in 0.8 per cent of the families.

## 2. Occupational Status of the Selected Families:

Regarding the occupational status of the selected families, the main occupation was agriculture. Out of one hundred and twenty families 45.8 per cent were found to be agriculturists. Daily wagers were 32.5 per cent and 16.7 per cent were involved in other occupations.

## 3. Distribution of the Selected Families according to annual Income:

The annual income of the families were found to be between Rs.300 - 1,500, When compared with the classification of income levels given by HUDCO 1994 (low income Rs.1,250 - 2,650, the income of the selected families were found to be below the lower level.

## 4. Educational Status of the Selected Adolescent Girls:

Table II gives the educational status of the selected adolescent girls.

TABLE II

EDUCATIONAL STATUS OF THE SELECTED ADOLESCENT GIRLS N = 120.

| Age in Years | Studied upto (percentage) | | | Studying in (percentage) |
|---|---|---|---|---|
| | Illiterate | Primary School | Middle School | Middle School |
| 13 | 1.7 | 6.7 | - | 28 |
| 14 | 2.5 | 5 | 0.8 | 13.3 |
| 15 | 11.7 | 17.5 | 4.2 | 8.3 |

It can be seen from the above Table that 1.7 per cent girls were illiterate, 6.7 per cent had studied upto primary school and twenty eight per cent were stuyding in the middle school in 13 years group. Among the girls belonging to 14 years group 2.5 per cent were illiterate, 5 per cent had studied upto primary school and 0.8 per cent had studied upto middle school. And 13.3 per cent of them were studying in the middle school. In the 15 years group 11.7 per cent were found to be illiterate, 17.5 per cent were educated upto primary school and 4.2 per cent had studied upto middle school and 8.3 per cent were stuying in the middle school. This is similar to the findings of Sharma et al (1988) in which drop out rate of girls in the rural areas, especially during the adlolescence period is higher.

## B. Dietary Pattern of the Target Families of the Adolescent Girls:

### 1. Food Consumed by the Selected Families:

All the 120 families mainly consumed rice and ragi. They also consumed millets like jowar and bajra. They included pulses like redgramdhal and black gram dhal more often in their diet than pulses like bengal gramdhal, green gramdhal and horse gram dhal. They did not consume greens often except drumstick leaves. They consumed gongura, agathi, thandukeerai and modakanthan also during season. All families consumed an appreciable amount of roots and tubers such as potato, carrot and onion. Other vegetables like brinjal, drumstick, ladiesfinger were also consumed by them. Vegetables such as radish, gourd varieties were consumed at times. Most of the families did not consume fruits often. Fleshy foods were consumed rarely. They consumed milk mostly in the form of coffee and payasam during occassions. Milk products such as butter, ghee were not consumed. Butter milk was taken by some of the families along with porridge. Alcohol was consumed by most of the men.

### 2. Methods of Cooking:

Boiling rice with excess water and straining the water was the usual method of cooking adopted by all the families.

In all the families vegetables, greens and pulses were cooked by boiling and absorption method. Other methods of cooking such shallow fat frying and steaming were adopted for the preparation of curry and idlis. Most of the families cooked twice a day and only very few cooked thrice a day.

### 3. Foods Given Under Special Condition:

During pregnancy no special food was given but they believed that foods like papaya caused abortion. They also believed that all gourd varieties were cold foods and foods like brinjal, modakanthan and dried fish were considered to be hot foods. Foods like potato, plantain and dhal were believed to be gas producing. Even though they had such beliefs, they were unable to avoid these foods due to their cheaper cost.

### 4. Foods Prepared During Festivals and Functions:

Twice a year, the selected families celebrated the temple festivals. These were the festivals which were celebrated with enthusiasm apart from pongal. During such special festivals they prepared special items such as sweet pongal, vadai, payasam and also fleshy food preparations. The other special items were murukku, laddu and adhirasam.

## 5. Diet During Illness:

During illness like fever and cold no special food was taken except rice kanji and unfermented porridge. Bread and milk were seldom consumed. During chicken pox hot foods and oil were avoided and cold foods like fruits and tender coconut water were given as they believe it would reduce the intensity of chicken pox. During dysentry, brinjal and dried fish were avoided as they believed that it worsens the condition.

## 6. Daily Meal Pattern of the Selected Adolescent Girls:

Table III depicts the daily meal pattern of the selected adolescent girls.

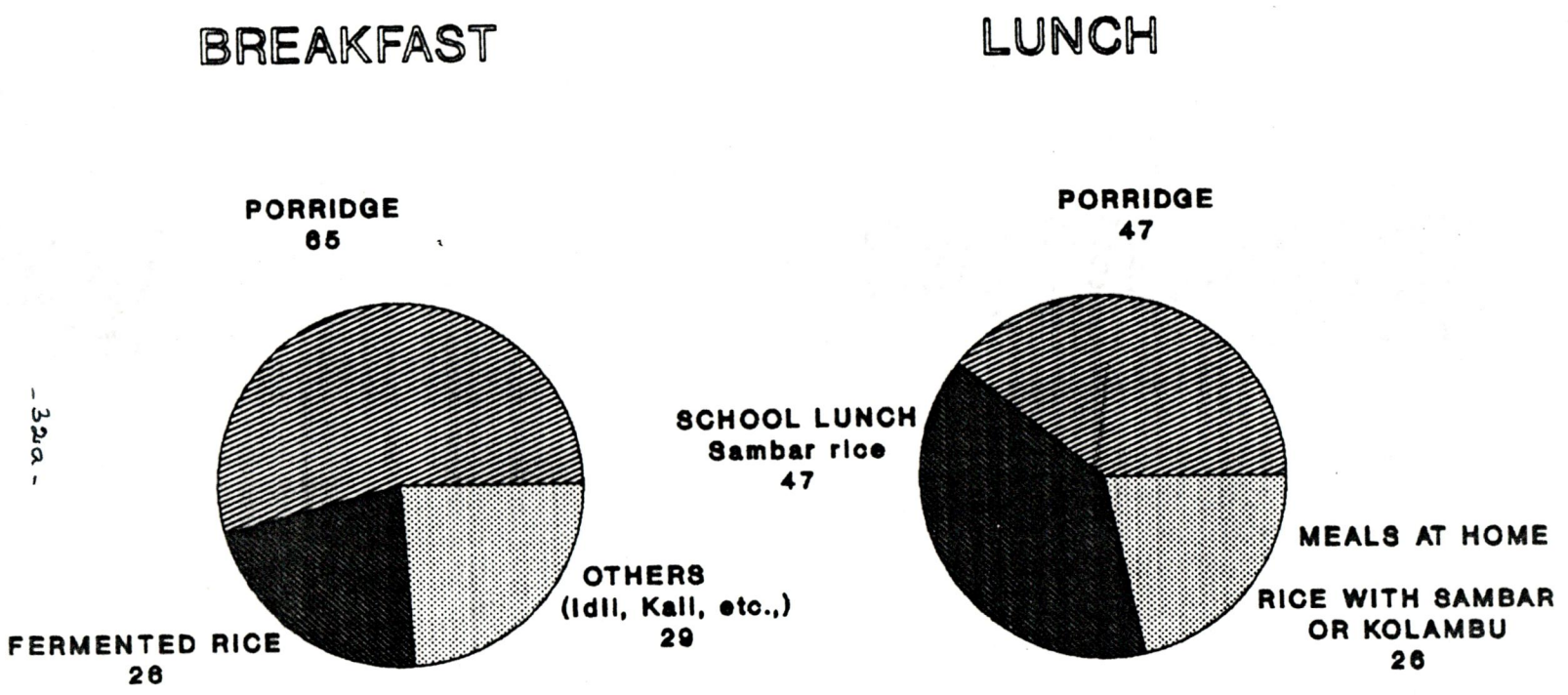
## TABLE III

DAILY MEAL PATTERN OF THE SELECTED ADOLESCENT GIRLS: N = 120.

| | Breakfast | | | Lunch | | | Dinner |
|---|---|---|---|---|---|---|---|
| | Porridge | Fermented rice | Others (Idli, Kali, etc.,) | Porridge | Meals at home Rice with Sambar or Kolambu | School lunch Sambar rice | Rice with Sambar or Kolambu |
| No. of girls | 65 | 26 | 29 | 47 | 26 | 47 | 120 |
| Percentage | 54.2 | 21.7 | 24.2 | 39.2 | 21.7 | 39.2 | 100 |

# Fig. 1. DAILY MEAL PATTERN OF THE SELECTED ADOLESCENT GIRLS (13-15 Years)

N = 120



From the above Table it was inferred that 54.2 per cent girls consumed porridge, 21.7 per cent rice and 24.2 per cent others (Rice, Kali etc.) as breakfast. For lunch 39.2 per cent consumed porridge 21.7 per cent of girls took meals at home and 39.2 per cent had school lunch. All the girls that is 100 per cent consumed rice for dinner. Generally a meal consists of rice with sambar or kolambu. A vegetable was used for making sambar or kolambu (Fig. 1).

## C. Comparison of The Nutritional Status of The Selected Adolescent Girls From Working And Nonworking Groups:

### 1. Anthropometric Measurements:

TABLE IV

MEAN HEIGHTS AND WEIGHTS OF THE SELECTED ADOLESCENT GIRLS

N = 120.

| | Age in years | Height in Cm | Weight in Kg | ICMR standard (wt in kg) |
|---|---|---|---|---|
| Working | 13-15 | 145.66 | 37.67 | 46.66 |
| Non working | 13-15 | 143.03 | 31.96 | 46.66 |

# Fig. 2. MEAN WEIGHT OF THE SELECTED ADOLESCENT GIRLS (13-15 Years)

N = 1210

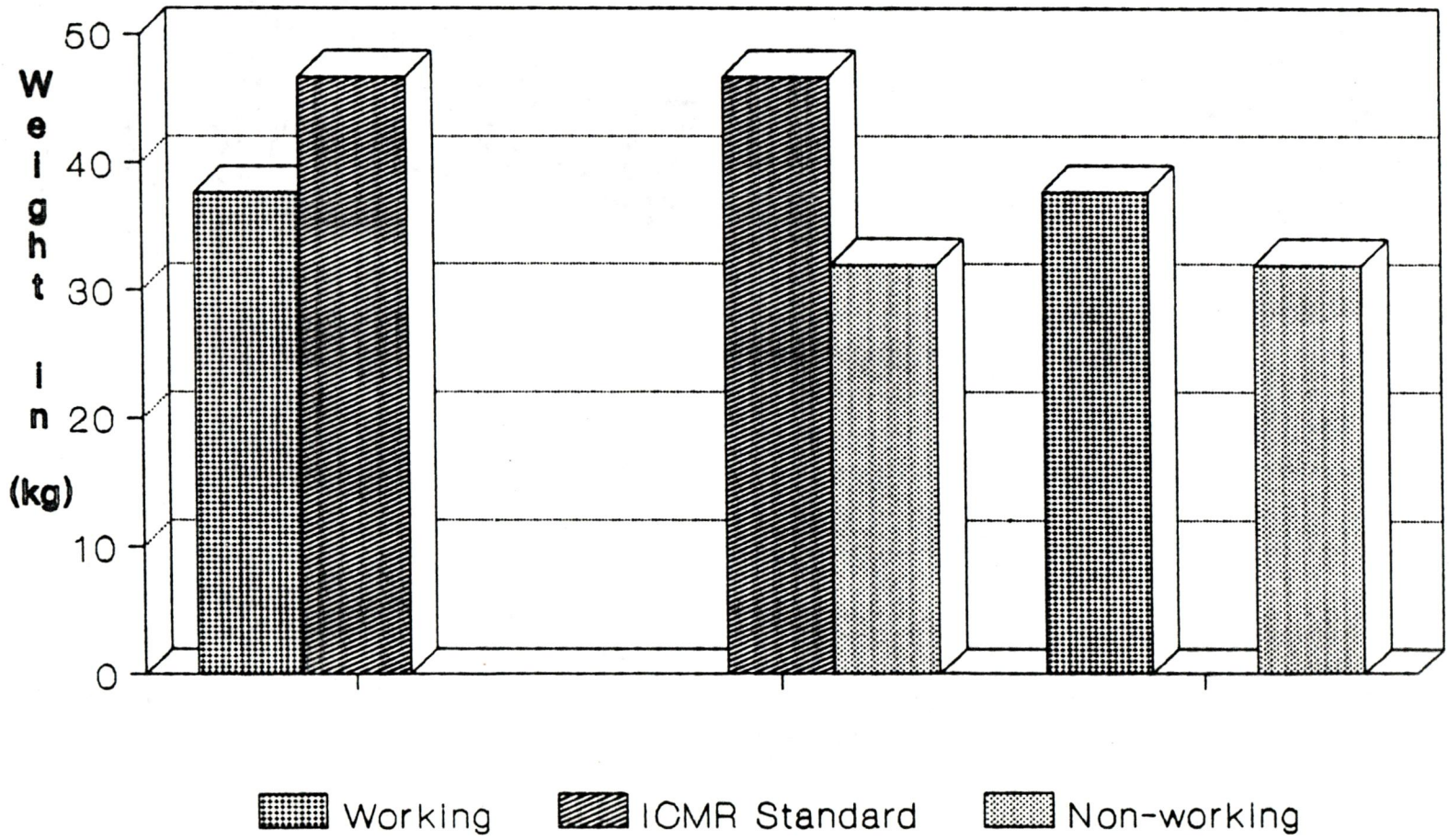


Table IV depicts the weight in kg of the target adolescent girls in comparison with the ICMR standard (1990). From the comparison it is shown that working adolescent girls had the mean height as 145.66cm and their corresponding weight in kg was 37.67 which was lower than the ICMR standard 46.66 kg. The mean height of non working girls was 143.03 cm and they also had lower weight 31.96 kg than the ICMR standard weight 46.66 kg. This is diagrammatically represented in the form of bar diagram (Fig. 2).

## 2. Clinical Examination:

**TABLE V**

**PREVALENCE OF CLINICAL SIGNS AMONG THE SELECTED ADOLESCENT GIRLS** N = 120.

| Clinical sign | Working | Non working |
|---|---|---|
| Anaemia | 32 | 15 |
| Angular stomatitis | 4 | 1 |
| Dry and scaly skin | 12 | 2 |
| General weakness | 4 | 8 |
| Bitot spots | 1 | 1 |
| Worm infestation | 7 | 4 |
| Xerosis Cornea | 1 | 4 |

# Fig. 3. PREVALENCE OF CLINICAL SIGNS AMONG THE SELECTED ADOLESCENT GIRLS (13-15 Years)

N = 120


1-Anaemia
2-Angular Stomatitis
3-Dry and Scaly Skin
4-General weakness
5-Bitot Spots
6-Worm Infestation
7-Xerosis Cornea

The clinical picture of the adolescent girls of the working and non working groups are given in Table V. The results show that most prevalent dificiency disease seen among both working and non working adolescent girls was anaemia. This was much more among the working group. This may be due to worm infestation and low intake of iron rich foods and also poor absorption of iron. Fifty three per cent of the working and 25 per cent of the non working adolescent girls were anaemic. Other prevalent deficiencies found among working group were worm infestation and dry and scaly skin. In the case of non working group general weakness, Xerosis cornea and worm infestation were found to be more prevalent next to anaemia. Twenty per cent and 11.6 per cent of the working adolescent girls had dry and scaly skin and worm infestation respectively. Thirteen per cent and 6.6 per cent were found to have general weakness and worm infestation respectively in the case of non working group. Seven per cent of working adolescent girls were found to be affected by both angular stomatitis and general weakness respectively. Other deficiency diseases were not much significant among both groups. The higher percentage of worm infestation may be the cause for the presence of anaemia among working girls which coincides with the research done by Vichai et al (1984) that high hookworm infestation rate due to lack of health facilities and poor hygienic conditions, accelerate the

development of iron deficiency anaemia because of increased blood losses (Fig. 3).

## 3. Food And Nutrient Intake:

### a. Food Intake

TABLE VI

MEAN FOOD INTAKE OF THE SELECTED ADOLESCENT GIRLS: N = 36.

| Food Stuff in g | Working (13-15 yrs) | Non-working (13-15 yrs) | RDA (13-15 yrs) |
|---|---|---|---|
| Cereals | 577 | 309 | 350 |
| Pulses | 7.3 | 21 | 70 |
| Green leafy vegetables | - | 8.6 | 150 |
| Other vegetables | 37 | 45.5 | 75 |
| Roots and tubers | 50 | 30 | 75 |
| Milk | - | 61.5 | 250 |
| Fats and Oils | 8 | 20 | 35 |
| Sugar and Jaggery | 12 | 16.2 | 30 |

As far as the cereal intake was concerned girls belonging to working group took more than the recommended daily allowances given by ICMR (1987) by 64.9 per cent.

Girls from non working group consumed cereals which was deficit by 11.7 per cent. The intake of pulses were less than the recommended allowances by 89.6 per cent in the case of working group and it was 70 per cent dificit in the case of non working group. As far as the green leafy vegetables intake was concerned none of them had consumed in the case of working group and only 11.1 per cent of non working girls consumed green leafy vegetables and it was deficit by 94.3 per cent. When compared with RDA the intake of other vegetables and roots and tubers by working group was deficit by 50.7 per cent and 33.3 per cent. In the case of non working group the deficit was found to be 33.3 per cent and 60 per cent respectively. Milk was consumed only by the non working group and it was dificit by 75.4 per cent. The consumption of fats and oils by both working and non working group were 77.1 per cent and 42.9 per cent less than the suggested quantities. The intake of sugar and jaggery was found to be less than the RDA by 60 per cent in the case of non working girls and it was deficit by 56 per cent in the case of non working girls. Smitha et al (1988) also found the similar food intake of the same age group in which the consumption of pulses, roots and tubers, other vegetables was inadequate while the intake of green leafy vegetables and fruits was completely lacking.

b. Nutrient Intake:

The nutrient intake of the adolescent girls belonging to both working and non working groups as computed from the food intake is given in the Table VII.

## TABLE VII

**MEAN NUTRIENT INTAKE OF THE SELECTED ADOLESCENT GIRLS N = 36**

| | Protein g | Fat g | Energy kcal | Calcium mg | Iron mg | Beta Carotene µg | Thiamine mg | Riboflavin mg | Vitamin C mg |
|---|---|---|---|---|---|---|---|---|---|
| Working (13-15 yrs) | 44 | 7 | 1963 | 1128.9 | 18.3 | 197.2 | 1.99 | 0.80 | 3.81 |
| Non-working (13-15 yrs) | 35 | 6 | 1240 | 369.9 | 7 | 344.4 | 0.94 | 0.45 | 17.04 |
| RDA (13-15 yrs) | 65 | 22 | 2060 | 600.0 | 28 | 2400 | 1.0 | 1.2 | 40 |

Regarding the energy intake both the working and non working groups, consumed less than the recommended allowances given by ICMR (1989) by 97 and 820 kilocalories respectively (4.7 per cent and 39 per cent deficit) which attributes to the low intake of cereals which are the main contributors of energy. The intake of protein was found to be 44g and 35g in working and nonworking groups respectively which was lesser than the recommended allowances by 21 and 30 grams (4.7 per cent and 39 per cent deficit). This shows the low intake of pulses and animal protein rich foods such as milk and egg. The consumption of fat in both groups was very much lower than the recommended allowances (68 per cent and 72.7 per cent dificit). The intake of calcium was found to be double the amount of the recommended allowances in the case of working adolescent girls (excess by 88.1 per cent). This may be due to the increased intake of ragi which is rich in calcium. It was seen that lesser amount of calcium was taken by the nonworking adolescent girls when compared to RDA (deficit by 38.3 per cent). Regarding their iron intake both the groups consumed less than the recommended allowance by 9.7 and 21 mg respectively (deficit by 34.6 per cent and 75 per cent). This reflects their poor dietary intake of iron rich foods. The intake of Betacarotene in the working and non working groups were 197 and 344 microgram respectively (deficit by 91.7 per cent and 85.6 per cent). This shows their low intake of vitamin A rich foods. Thiamine,

riboflavin and Vitamin C intake were found to be 1.99, 0.80 and 3.81 milli gram respectively (Riboflavin and vitamin C deficit by 33.3 per cent and 90.5 per cent) in the working group and 0.94, 0.45 and 17.04 milli gram (deficit by 6 per cent 62.5 per cent and 57.4 per cent) respectively in the non working group.

## 4. Biochemical Assessment:

### TABLE VIII

**BLOOD HAEMOGLOBIN LEVELS OF THE SELECTED ADOLESCENT GIRLS**

**(CYANMETHAEMOGLOBIN METHOD)** **N = 36**

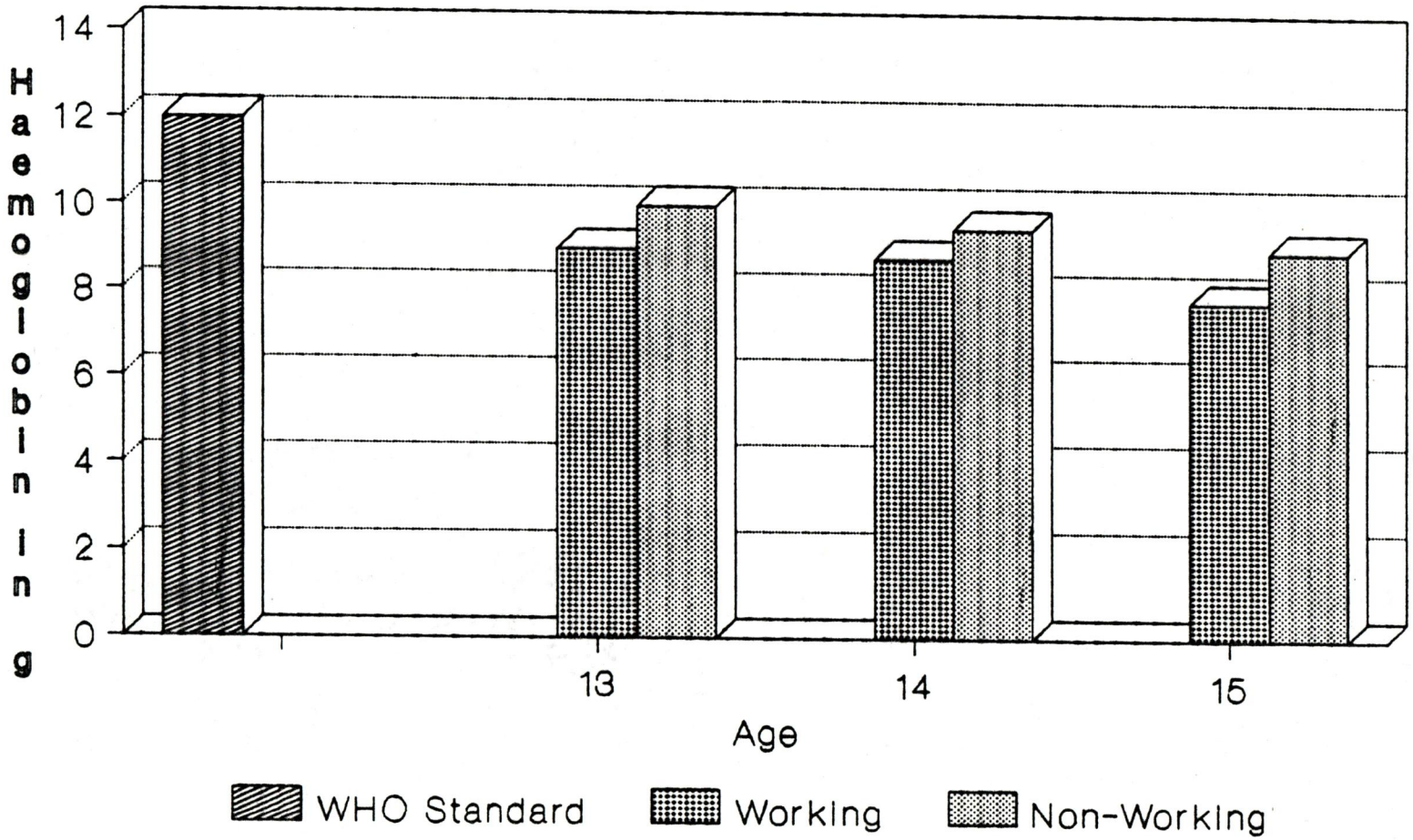
| Age in years | Working | | Non working | |
|---|---|---|---|---|
| | in g | in % | in g | in % |
| 13 | 9.0 | 75 | 10 | 83 |
| 14 | 8.8 | 73 | 9.5 | 79 |
| 15 | 7.8 | 65 | 9.0 | 75 |

★ 12 g = 100% (WHO STANDARD, 1989).

The haemoglobin levels in the working group of 13 years was found to be 9.0 g per 100 ml (75 per cent). In the non

# Fig. 4. BLOOD HAEMOGLOBIN LEVELS OF THE SELECTED ADOLESCENT GIRLS

N = 36



working group it was 10 g/100 ml (83 per cent). The haemoglobin levels among the 14 years working group was found to be 8.8 g per 100 ml (73 per cent) and it was 9.5 g per 100 ml in the case of non working group (79 per cent). The working group had the haemoglobin level of 7.8 g per 100 ml (65 per cent) in the age of 15 years whereas the non working group had 9.0 g per 100 ml (75 per cent). These low haemoglobin levels may be due to low intake of iron rich foods such as green leafy vegetables, worm infestation, and poor absorption of iron. As per WHO standard anaemia is considered to be mild, moderate or severe, when haemoglobin concentrations are above 80 per cent, between 80 per cent and 60 per cent or less than 60 per cent of the cut-off levels (12 g = 100%) respectively (Demaeyer, 1989). When compared with WHO standard the selected target adolescent girls were moderately anaemic. This is also diagrammatically represented in the form of bar diagram (Fig. 4).

## D. Impact of Diet Counselling:

Table IX implies the nutrition awareness among the selected adelescent girls before and after diet counselling.

TABLE IX

NUTRITION AWARENESS AMONG THE SELECTED ADOLESCENT GIRLS BEFORE AND AFTER DIET COUNSELLING N = 36.

| Nutritional Facts | Working | | Nonworking | |
|---|---|---|---|---|
| | Before | After | Before | After |
| Protein helps in growth | - | 18 | 14 | 18 |
| Iron deficiency results in anaemia | - | 17 | 14 | 18 |
| Vitamin C deficiency leads to bleeding gums | - | 14 | - | 18 |
| Menstrual loss of iron in adolescent girls call for increased dietary iron intake | - | 15 | 2 | 18 |
| Papaya and carrot should be included to have clear vision | - | 14 | 8 | 18 |
| Nutrition education helps us to lead a healthy life | - | 16 | 18 | 18 |
| Milk is rich in calcium and protein | 4 | 9 | - | 18 |
| Ragi is rich in calcium and fibre | - | 5 | - | 18 |
| Nutrient loss is minimised when vegetables are cooked in closed vessel | - | 15 | - | 18 |
| Green leafy vegetables are rich in Vitamin A | 2 | 16 | - | 18 |

The nutrition knowledge of the adolescent girls before and after diet counselling were found out by administering the questionaire. Their answers to the questions before and after diet counselling was used to assess the effectiveness of diet counselling. From the above Table it was inferred that before giving diet counselling most of the working girls were unaware of certain important nutritional facts, which are listed in the Table IX. After giving diet counselling there was markable improvement in the level of nutrition knowledge. Among the nonworking group before giving diet counselling, few of them were aware of the importance of consuming nutritious foods and basic facts about nutrition. However they did not have clear nutritional knowledge. But after giving diet counselling all the girls knew the facts related to nutrition.

# SUMMARY AND CONCLUSION

# V SUMMARY AND CONCLUSION

A study was conducted to elicit information regarding the "Nutritional status of adolescent girls in rural areas of Tindivanam and impact of diet counselling". One hundred and twenty families were selected to gather information regarding their socio economic conditions and dietary habits. One hundred and twenty adolescent girls were selected from one hundred and twenty families by convenience sampling method, 60 from working group and 60 from nonworking group. Detailed anthropometric investigations and clinical examinations were conducted. Thirty six samples, 18 from each group were selected for weighment survey and assessment of haemoglobin level. These samples were also given diet counselling and the impact was noted.

Following are the findings of the study.

1. The main occupation of the rural areas of Tindivanam is agriculture. Their economic status was low and the amount of money spent of food was also very low.
2. The staple food consumed was rice and ragi porridge. They included more roots and tubers and other vegetables compared to green leafy vegetables.

3. No specific food was given during pregnancy and lactation. But they included cold foods during summar. They believed that hot foods should not be included while suffering from chickenpox.

4. The menu was found to be monotonous. The methods of cooking cereals were boiling. Vegetables and pulses were cooked by absorption method.

5. The weighment survey conducted for thirty six samples, 18 from each group indicated that the cereal intake was more in the case of working group and less in the case of nonworking group when compared with recommended daily allowances. Regarding the intake of green leafy vegetables, other vegetables and roots and tubers it was found to be less than the recommended daily allowances in both the groups. Fats and oils, sugar and jaggery were consumed in negligible amounts. The iron and Beta-carotene intake were less when compared with the recommended daily allowances for both the groups. Their diets were low in vitamin C also. The intake of protein, energy, calcium, thiamine and riboflavin were more in the case of working group than the other group. The intake of Beta-carotene and vitamin C were more in the case of nonworking group when compared with the other group.

6. The mean weights of adolescent girls in the age of 13, 14 and 15 years belonging to working group and

nonworking group were lower than the standards given by ICMR (1990).

7. The clinical examination revealed that majority of the adolescent girls from both the groups were suffering from anaemia. Dry and scaly skin and worm infestation in the case of working group and general weakness in the case of nonworking group were found.
8. The biochemical assessment indicated lower haemoglobin level in girls belonging to working compared to nonworking group. The haemoglobin level of working girls were 75 per cent, 73 per cent and 65 per cent in the age of 13, 14 and 15 years as compared to the non-working girls who had a haemoglobin level of 83, 79 and 75 per cent respectively.
9. An effort was made to teach the basic facts of nutrition to thirty six adolescent girls (sub samples). The evaluation of diet counselling reveals that they have benefitted by the counselling given.

## RECOMMENDATIONS

Further study along with the following lines are recommended.

1. Longitudinal studies can be carried out on adolescent girls with low haemoglobin levels and the impact of diet counselling can be studied after a

period of six months or one year.

2. The impact of deworming and vitamin supplementation on the level of haemoglobin can be studied on a group of adolescent girls for an extended period of time.

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# APPENDIX

APPENDIX - I

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN - COIMBATORE.

SOCIO ECONOMIC AND DIETARY SURVEY

1. Name of the Interviewer :
2. Name of the Interviewee :
3. Age :
4. Sex :
5. Occupation :
6. Name and address of the head of the family :
7. Income of the head of the family :
8. Type of family : Nuclear Joint
9. Vegetarian/ Nonvegetarian :
10. General information :

| Sl. No. | Name of the member | Age | Relation to the subject | Educational Status | Occupation |
|---|---|---|---|---|---|

11. Other sources of Income (Rs./Month)

| SOURCE | Rs. | P. |
|---|---|---|
| a. Business Earnings | | |
| b. Receipts from properties | | |
| Land | | |
| Building | | |
| c. Income from Investments | | |
| d. Allowances from parents/ inlaws | | |
| e. Other earnings | | |
| Total Family Income | | |

12. Are you aware of nutritious food?

YES NO

If yes

a. Specify the source

i. School, ii. Social Worker, iii. Doctor, iv. Primary Health Centre, v. Magazines/books, vi. Any other.

b. List a few of the nutritious foods.

i. ii.

iii. iv.

13. FREQUENCY OF CONSUMPTION OF THE FOLLOWING FOOD ITEMS:

| Food Item | Amount in g. | Frequency of consumption | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Monthly | Rarely |
| CEREALS | | | | | |
| Bajra | | | | | |
| Ragi | | | | | |
| Jowar | | | | | |
| Rice Flakes | | | | | |
| Wheat Flour | | | | | |
| Rice raw milled | | | | | |
| Rice parboiled milled | | | | | |
| Others (specify) | | | | | |
| PULSES | | | | | |
| Red gram dhal | | | | | |
| Bengal gram dhal | | | | | |
| Bengal gram dhal roasted | | | | | |
| Black gram dhal | | | | | |
| Green gram dhal | | | | | |
| Others (specify) | | | | | |

| Food Item | Amount in g. | Frequency of consumption | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Monthly | Rarely |
| GREEN LEAFY VEGETABLES | | | | | |
| Thandukeerai | | | | | |
| Gongura | | | | | |
| Agathi | | | | | |
| Cabbage | | | | | |
| Drumstick leaves | | | | | |
| Manathakkali leaves | | | | | |
| Mint | | | | | |
| Corriander leaves | | | | | |
| Curry leaves | | | | | |
| Modakanthan Keerai | | | | | |
| Ponnanganni | | | | | |
| Spinach | | | | | |
| Others (specify) | | | | | |
| ROOTS & TUBERS | | | | | |
| Beet root | | | | | |
| Carrot | | | | | |
| Onion | | | | | |
| Potato | | | | | |
| Radish | | | | | |
| Yam | | | | | |
| Colacasia | | | | | |
| Others (specify) | | | | | |

| Food Item | Amount in g. | Frequency of consumption | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Monthly | Rarely |
| OTHER VEGETABLES | | | | | |
| Avarai | | | | | |
| Beans | | | | | |
| Bittergourd | | | | | |
| Bottlegourd | | | | | |
| Brinjal | | | | | |
| Cho-Cho marrow | | | | | |
| Drumstick | | | | | |
| Ladies finger | | | | | |
| Plantain green | | | | | |
| Pumpkin fruit | | | | | |
| Ridge gourd | | | | | |
| snake gourd | | | | | |
| Others (specify) | | | | | |
| NUTS AND OIL SEEDS | | | | | |
| Coconut (Fresh) | | | | | |
| Gingelly seeds | | | | | |
| Groundnut | | | | | |
| FRUITS | | | | | |
| Apple | | | | | |
| Banana | | | | | |
| Cashew fruit | | | | | |

| Food Item | Amount in g. | Frequency of consumption | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Monthly | Rarely |
| FRUITS | | | | | |
| Grapes | | | | | |
| Guava | | | | | |
| Lemon | | | | | |
| Musambi | | | | | |
| Mango | | | | | |
| Papaya | | | | | |
| Tomato | | | | | |
| Others (specify) | | | | | |
| MEAT POULTRY & FISH | | | | | |
| Fish | | | | | |
| Egg | | | | | |
| Fowl | | | | | |
| Mutton | | | | | |
| Liver (goat) | | | | | |
| Others (specify) | | | | | |

| Food Item | Amount in g. | Frequency of consumption | | | |
|---|---|---|---|---|---|
| | | Daily | Weekly | Monthly | Rarely |
| **MILK AND MILK PRODUCTS** | | | | | |
| Milk (Cow's) | | | | | |
| Curds (Cow's) | | | | | |
| Milk (Buffalo's) | | | | | |
| Curds(Buffalo's) | | | | | |
| Butter Milk | | | | | |
| Ghee | | | | | |
| Others (specify) | | | | | |
| **FATS & EDIBLE OILS** | | | | | |
| Ground Nut Oil | | | | | |
| Gingelly Oil | | | | | |
| Coconut Oil | | | | | |
| Others (specify) | | | | | |
| **SUGARS** | | | | | |
| Sugar-cane | | | | | |
| Jaggery (date palm) | | | | | |
| Others (specify) | | | | | |

14. DAILY MEAL PATTERN

| Day | Breakfast | Mid Morning | Lunch | Tea | Dinner |
|---|---|---|---|---|---|
| | | | | | |

15. METHODS OF COOKING

| FOOD ITEM | Boiling | Steaming | FRYING | | Stewing or |
|---|---|---|---|---|---|
| | | | Shallow fat | Deep Fat | |
| Cereals | | | | | |
| Pulses | | | | | |
| Greens | | | | | |
| Vegetables | | | | | |
| Egg | | | | | |
| Meat | | | | | |
| Fish | | | | | |
| Others | | | | | |

16. Do you skip any of the meal of a day?

YES NO

a. If yes, specify the reason

Lack of Time

Non availability
of food

Others

17. What are the special items you include during festivals?

i.

ii.

iii.

iv.

v.

18. DETAILS REGARDING FOOD FADS AND TABOOS

| Sl. No. | Food Fad | List of Foods | Conditions/stages in which these foods are included/avoided | Foods that are Avoided | included |
|---|---|---|---|---|---|
| 1. | Hot Foods | | | | |
| 2. | Cold Foods | | | | |
| 3. | Gas producing | | | | |
| 4. | Others | | | | |

19. DO YOU SUFFER FROM THE FOLLOWING

| CONDITION | DURATION DAYS | FREQUENCY / MONTH |
|---|---|---|
| Fever | | |
| Cold | | |
| Diarrhoea | | |
| Vomiting | | |
| Dysentry | | |
| Cough | | |
| Others (specify) | | |

a. If Yes, specify the diet followed during illness

| ILLNESS | TYPE OF DIET |
|---|---|
| Fever | |
| Cold | |
| Diarrhoea | |
| Dysentry | |
| Cough | |
| Vomiting | |
| Others (specify) | |

20. At what age did you attain puberty?

12 years

13 years

14 years

15 years

21. Are your periods regular.

Yes

No

22. Is there excess blood loss during menstrual period?

Yes No

23. Do you feel often fatique, breath lessness on exertion

Yes No

24. Do you take any vitamin - mineral tablet regularly?

Yes No

25. Have you been diagnosed as anaemic any time before?

Yes No

26. Have you met with any accident which led to excessive blood loss?

Yes No

APPENDIX - II

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN - COIMBATORE

## CLINICAL EXAMINATION FORM

Name of the Investigator Date :

Name of the Subject :

Age :

Sex :

ANTHROPOMETRY MEASUREMENTS

Height in CM

Weight in kg.

CLINICAL ASSESSMENT SCHEDULE (TICK IN THE APPROPRIATE PLACE)

I. Eyes

a. Conjunctiva

i. Dry and Wrinkled

ii. Pale Conjunctiva

iii. Conjunctiva very dry and Bitot's spots present

b. Pigmentation

i. Slight discolouration

ii. Severe earthy discolouration

II. MOUTH

a. Lips

i. Angular stomatitis mild

ii. Angular stomatitis marked

b. Tongue

i. Red

ii. Red & Raw

iii. Pale

c. Gums

i. Bleeding

d. Teeth

i. Caries - Mild

ii. Caries - Marked

III. HAIR

i. Loss of lustre

ii. Discoloured and dry

iii. Sparse and brittle

IV. SKIN

i. Loss of lustre

ii. Dry and rough or crazy pavements

V. Oedema (in severe cases of anaemia)

VI. Koilonychia

## APPENDIX - III

### AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN - COIMBATORE

### FAMILY AND INDIVIDUAL (ADOLESCENT GIRL) FOOD CONSUMPTION SURVEY

Name of the Investigator :

Sex :

Name of the Subject :

Age :

Date :

| Meal | Menu | Wt. of the total raw ingredients used by the family (g) | Wt. of the total cooked food consumed by the family (g) | Amount of cooked food consumed by the individual (g) | Raw equivalents consumed by the individual (g) |
|---|---|---|---|---|---|

| Meal | Menu | Wt. of the total raw ingredients used by the family (g) | Wt. of the total cooked food consumed by the family (g) | Amount of cooked food consumed by the individual (g) | Raw equivalents consumed by the individual (g) |
|---|---|---|---|---|---|

## APPENDIX IV

## HAEMOGLOBIN ESTIMATION BY CYANMETHEMOGLOBIN METHOD

Estimation of haemoglobin by this method has been recommended by the Xth International Haematology Congress and World Health Organization Expert Committee on Nutritional Anaemias. This method measures not only oxyhaemoglobin, but also carbon - monoxide haemoglobin. With filter type photoelectric calorimeters, the single relatively broad band of cyanmethaemoglobin in the green spectral region has a distinct advantage. The method can be modified to determine haemoglobin in dry blood on filter paper also.

Procedure:

1. Exactly 5 ml of Drabkin's diluent solution are measured into a dry test tube, from a burette or pipette with a suction bulb.

2. Exactly 0.02 ml of blood from standardized haemoglobin pipette is transferred into the diluent solution. Usual care in filling and cleaning of loaded haemoglobin pipette must be exercised.

3. The pipette is rinsed three times with diluent solution, without allowing the formation of air bubbles in the solution.

4. The blood is mixed thoroughly with diluent by rotating the tube.

5. A period of 20 minutes is permitted for the cyanmethaemoglobin to form.

6. 5 ml of diluent solution are used to get the blank reading.

7. With green filter No.540 tube, the readings are taken on photo - electric calorimeter setting blank at 0.

Calibration Procedure:

1. The total blood iron is determined by Wong's method. This determination would give absolute amount of haemoglobin.

2. Exactly 0.02 ml of this known blood sample are measured out as described above into 5.0, 7.5, 10.0, 12.5 and 15.0 ml respectively of diluent solution and mixed by rotating the tubes. These solutions are now equivalent to blood samples containing respectively 100, 67, 50, 40 and 30 per cent that of the original solution.

3. Per cent transmission using green filter 540 against diluent as blank set at 0, are read.

4. A standard graph using these haemoglobin concentration and corresponding transmission is prepared.

Reagents: Drabkin's diluent solution

| | |
|---|---|
| Sodium Bicarbonate | 1 gm |
| Potassium cyanide | 0.05 gm |
| Potassium ferricyanide | 0.20 gm |
| Distilled water to make | 1000 ml |

This solution must be preserved in dark brown bottle and preferably kept under cold storage. Its preparation and handling should be done with great care. This solution should not be used after a precipitate has formed at the bottom of storage bottle.

APPENDIX V

AVINASHILILNGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN, COIMBATORE.

சத்துணவுத் தெரிவு

கீழ்காணும் வினாக்களுக்கான விடைகளைக் குறியிடவும்:

01. புரதம் நமக்கு

1. உடல் வளர்ச்சிக்கு உதவுகிறது
2. உடலுக்கு சக்தியைத் தருகிறது.
3. உடல் எடையைக் குறைக்கிறது.

02. வைட்டமின் A -வினால் ஏற்படும் நன்மை

1. வழ வழப்பான சருமம்
2. தெளிவான கண் பார்வை
3. தலை முடியைப் பாதுகாத்தல்

03. வைட்டமின் C நிறைந்துள்ள பழங்கள்

1. புளிப்பான பழங்கள்
2. கசப்பான பழங்கள்
3. இனிப்பான பழங்கள்

04. வைட்டமின் A அதிகம் உள்ள உணவு

1. பச்சைக் காய்கறிகள்
2. தானியங்கள்
3. பருப்பு வகைகள்

05. மலச்சிக்கலை குறைக்க உதவும் சத்து

1. புரதச் சத்து
2. நார்ச் சத்து
3. கொழுப்புச் சத்து

06. இரும்புச் சத்து குறைவினால் ஏற்படும் நோய்

1. இரத்த சோகை
2. காய்ச்சல்
3. சரும நோய்

07. தெளிவான கண் பார்வைக்கு சேர்த்துக் கொள்ள வேண்டிய உணவுப் பொருட்கள்

1. பப்பாளி, கேரட்
2. முருங்கைக்காய், வெங்காயம்
3. பருப்பு வகைகள்

08. பல் ஈறுகளில் இரத்தம் வருதலுக்குக் காரணம்

1. வைட்டமின் C – சத்துக் குறைவு
2. வைட்டமின் A – சத்துக் குறைவு
3. வைட்டமின் K – சத்துக் குறைவு

09. சூரிய ஒளியின் மூலம் நமக்குக் கிடைப்பது

1. வைட்டமின் D
2. வைட்டமின் C
3. வைட்டமின் E

10. பப்பெயிதிய பெண்களுக்கு இரும்புச் சத்து அதிகம் தேவைப்படக் காரணம்

1. மாத விலக்கின் போது இரத்தம் வெளியேற்றப்படுகிறது
2. கூடுதல் அழகைப் பெறுவதற்கு
3. கூடுதல் உடல் எடையைப் பெறுவதற்கு

11. இரும்புச் சத்து அதிகம் நிறைந்துள்ள காய்கறிகள்

1. கீரை வகைகள்
2. கிழங்கு வகைகள்
3. பச்சை, புடலங்காய் வகைகள்

12. உணவு சாப்பிடுவதின் பயன்கள்

13. சத்துணவுக் கல்வியினால் நமக்கு உண்டாகும் நன்மை

1. நம் உடலை அழகு படுத்த முடிகிறது
2. நம் உடலை நோய்களிலிருந்து காக்க முடிகிறது
3. பயனேதும் இல்லை

14. கேழ்வரகில் அதிகம் நிறைந்துள்ள சத்துக்கள்

1. நார்ச்சத்து, சுண்ணாம்புச் சத்து
2. புரதச்சத்து, வைட்டமின் சத்து
3. தாதுச் சத்து, கார்போஹைட்ரேட்

15. பழங்களில் அதிகம் நிறைந்துள்ள சத்துக்கள்

1. வைட்டமின்கள், தாதுக்கள்
2. புரதச்சத்து, சுண்ணாம்புச் சத்து
3. கார்போஹைட்ரேட்

16. கேரட்டின் முக்கிய பயன்

1. தெளிவான கண் பார்வையைத் தருகிறது
2. சருமத்தைப் பாதுகாக்கிறது
3. உடலழகைக் காக்கிறது

17. பாலில் நிறைந்துள்ள சத்துக்கள்

1. சுண்ணாம்புச் சத்து, புரதச் சத்து
2. கார்போஹைட்ரேட் சத்து
3. கொழுப்புச் சத்து

18. காய்கறிகளை பாத்திரத்தில் மூடி வைத்து சமைக்கும்போது அவற்றில் உள்ள சத்துக்கள் வெளியேற்றப்படுவதில்லை

ஆம் இல்லை

19. உடல் இரத்தத்தில் சர்க்கரை அளவுக்கு அதிகமானால் ஏற்படும் நோய்

1. காச நோய்
2. நீரழிவு நோய்
3. இரத்த அழுத்த நோய்

20. சராசரிக்கும் அதிக எடை உள்ளவர்கள் குறைத்து சாப்பிட வேண்டியது

1. நார்ச்சத்து நிறைந்து இருக்கும் உணவுப்பொருட்கள்
2. கொழுப்புச் சத்து நிறைந்திருக்கும் உணவுப்பொருட்கள்
3. புரதச் சத்து நிறைந்து இருக்கும் உணவுப்பொருட்கள்

21. வெகு நேரம் பசி எடுக்காமல் இருக்க உதவும் சத்து

1. கொழுப்புச்சத்து
2. வைட்டமின் சத்து
3. புரதம்

22. இரத்த அழுத்த நோய் உள்ளவர்கள் பின்பற்ற வேண்டியது

1. சாப்பாட்டில் உப்பைக் குறைத்து உண்ணுதல்
2. சர்க்கரை நிறைந்த பொருட்களைக் குறைத்து உண்ணுதல்
3. தானியங்கள், பருப்பு வகைகள் குறைத்து உண்ணுதல்

23. மாத விலக்கின்போது வெளியேற்றப்படும் தாது சத்து

1. இரும்புச் சத்து
2. சுண்ணாம்புச் சத்து
3. புரதச் சத்து

24. பிரசவித்த பெண்களுக்கு இரத்த சோகை வந்தால், அது அவர்கள் கருவுறும் காலத்தில், குழந்தையின் உடல் நலத்தைப் பாதிக்கும்

ஆம் இல்லை

25. பிரசவித்த பிறகு இரும்புச்சத்து நிறைந்த உணவுப்பொருட்களைச் சாப்பிடாவிட்டால் பெண்களுக்கு இரத்த சோகை வர அதிகம் வாய்ப்பு இருக்கிறது

ஆம் இல்லை