SPECIMEN FORMAT FOR THESES OF MONTH

Faculty	:	Home Science
Department	:	Food Science and Nutrition
Branch/ Area:	:	Nutrition
Sub Subject Heading:	:	Precision Nutrition
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Title of the thesis	:	Precision Nutrition Approach for Prevention and Management of Obesity
(i) In Roman Script		
(ii) In roman Script		
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Name of Supervisor	:	Prof. C.A.Kalpana
Designation of Supervisor	:	Head of the Department, Food Science and Nutrition and Deputy Dean, School of Home Science.
Centre/department/school in which research was conducted	:	Department of Food Science and Nutrition School of Homescience

University's Name & Address : AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN, COIMBATORE – 641 043

Abstract within 300 words:

In the recent years, there has been a growing interest to utilise the precision nutrition approach for the prevention, management and treatment of obesity, which takes into consideration the interaction between food and the human and microbial genome. It is quite evident that awareness and popularity about genetic testing for personalised nutrition is gaining momentum. Consumer attitudes and perceptions towards genetic testing to determine the risks of a predisposition to various diseases have already been examined by several studies, consumer acceptance of personalised nutrition have not been studied in the Indian population till date. In phase one of the study, Consumer acceptance of genetic testing and the responses towards perceived advantages of receiving DNA based dietary advice were ease of understanding and specificity of the diet advice, which was the most frequently reported theme (57.5%), followed by more personalised and enjoyable (22.4%) and reduced costs due to disease prevention (20.1%). The study concluded that individuals were optimistic and perceived many advantages of nutrigenetic testing. The study populations was optimistic and were willing to adopt genetic tests for personalised nutrition recommendations. In phase two of the study, we compared the differences in anthropometric measurements, dietary intake and dietary adherence among standard generic dietary advice, personalized nutrition advice based on nutrigenetic variations and the precision nutrition advice based on nutrigenetic variations and gut microbiome profiling. A statistically significant increase in the Bacteroidetes genus was observed in the personalized nutrition group ($p = .04$). The change (delta) values in gut microbiome composition in personalized nutrition group were significantly higher at the end of 90 days. Gut microbiome-based personalized microbiome modulation through diet significantly improves gut microbiome profiles among obese individuals. Further studies are needed with larger sample size to validate these findings and long-term follow-up.

i) Major objectives :

Primary Objective:

- Determine whether nutrigenetically tailored, gut-microbiome based diet helps in the prevention and management of obesity.

Secondary Objectives

- Examine the factors influencing consumer acceptance of genetic testing for personalised nutrition.
- Develop & design an algorithm for formulating a genetic based diet & gut microbiome-based diet.
- Evaluate the impact of precision dietary recommendations on long term weight management among obese adults.

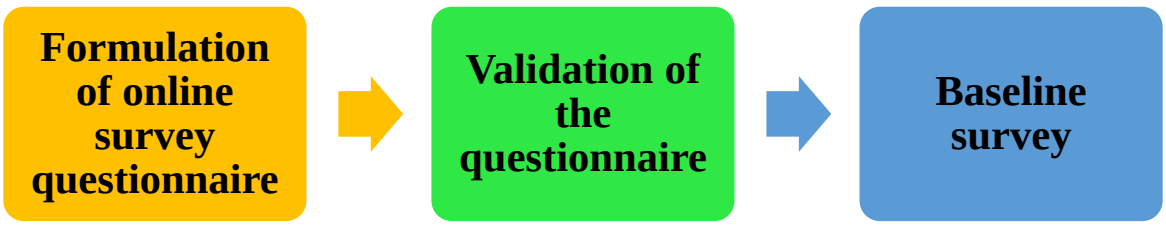
ii) Hypothesis:

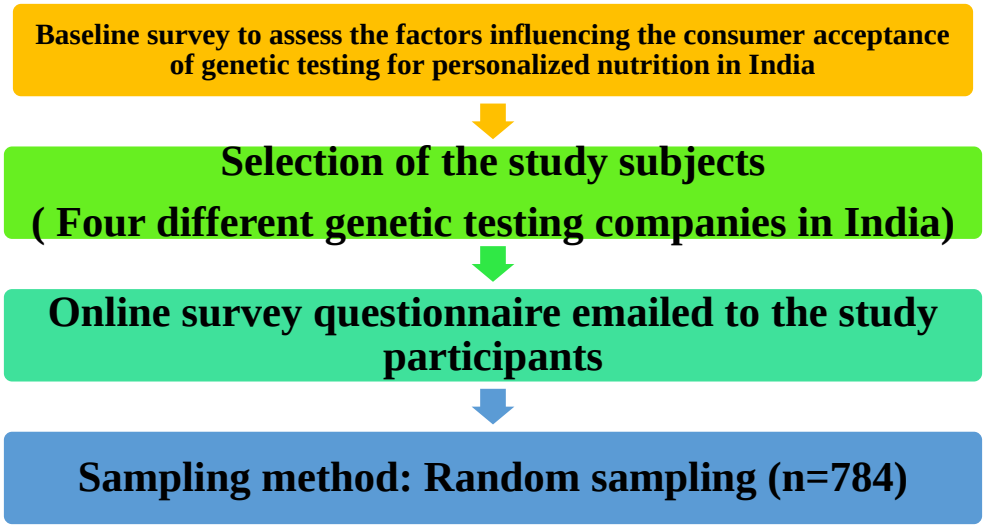
H1: Precision nutrition approach that includes nutrigenetics and gut-microbiome based dietary advice is more effective than generic dietary advice.

H2: Precision nutrition approach results in better compliance and long-term weight loss maintenance.

iii) Methodology :

Phase I: Assessment of factors influencing consumer acceptance of genetic testing for personalised nutrition in India.





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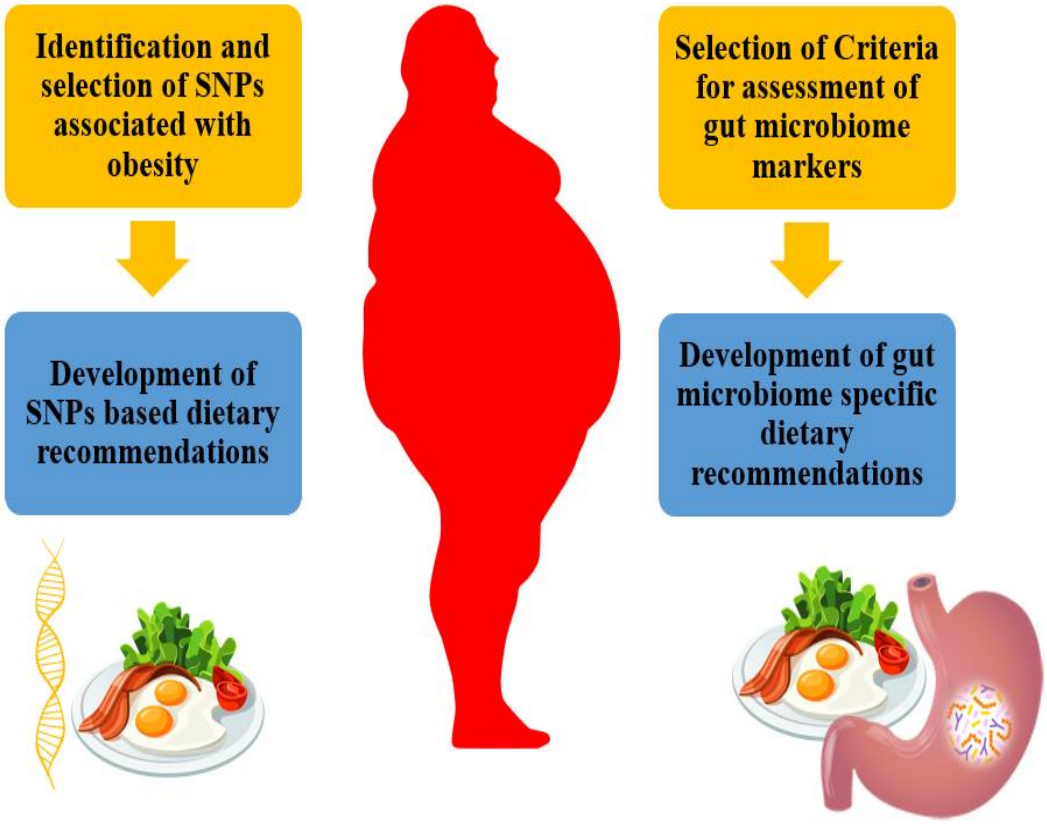
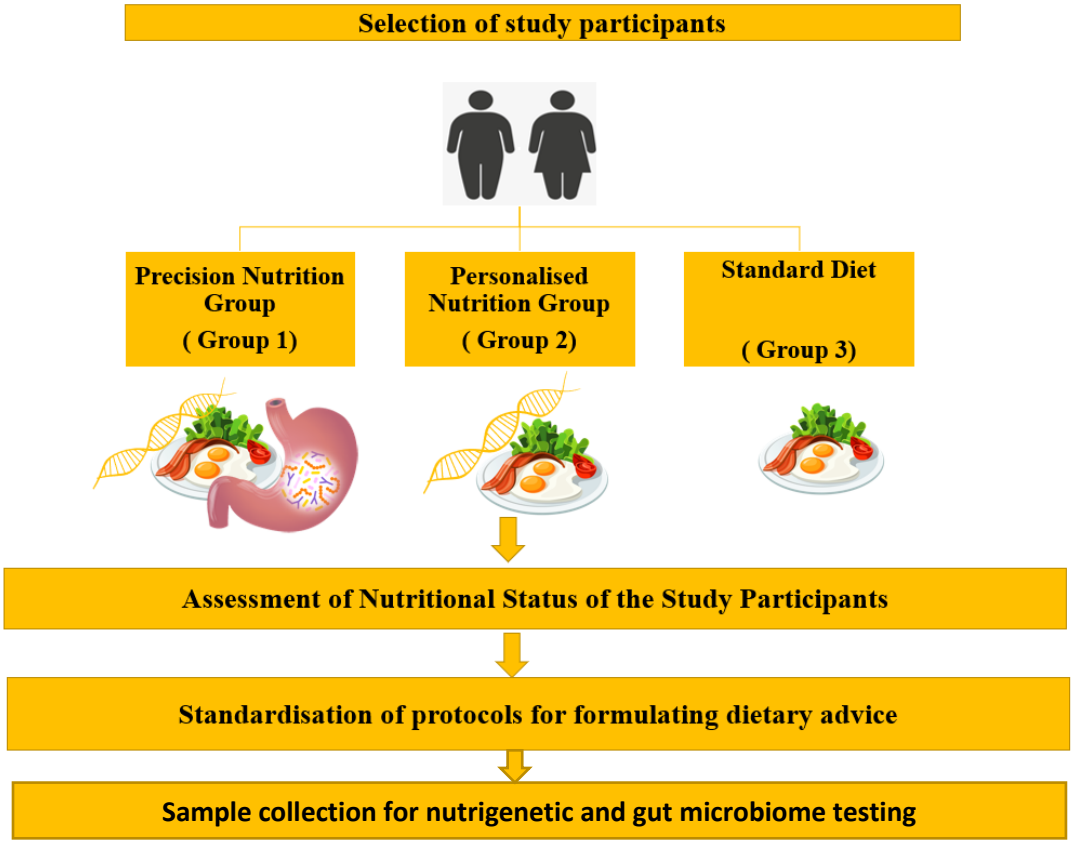
Phase II: Development and Design of algorithm for formulating a gene and gut microbiome based dietary advice for obese individuals

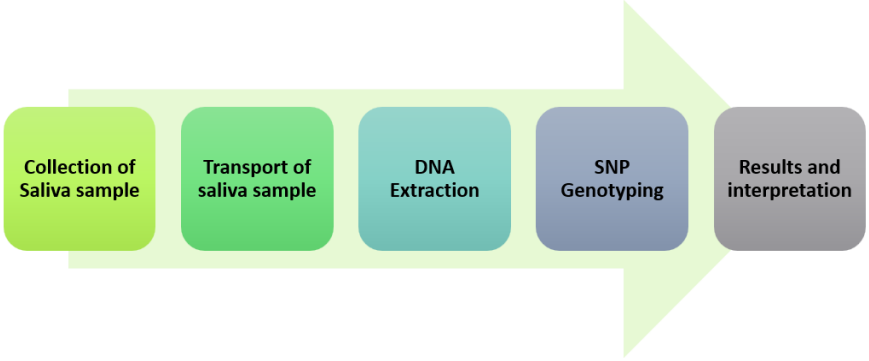


Phase III: Comparative analysis of precision nutrition vs generic nutrition based dietary advice on long term weight management

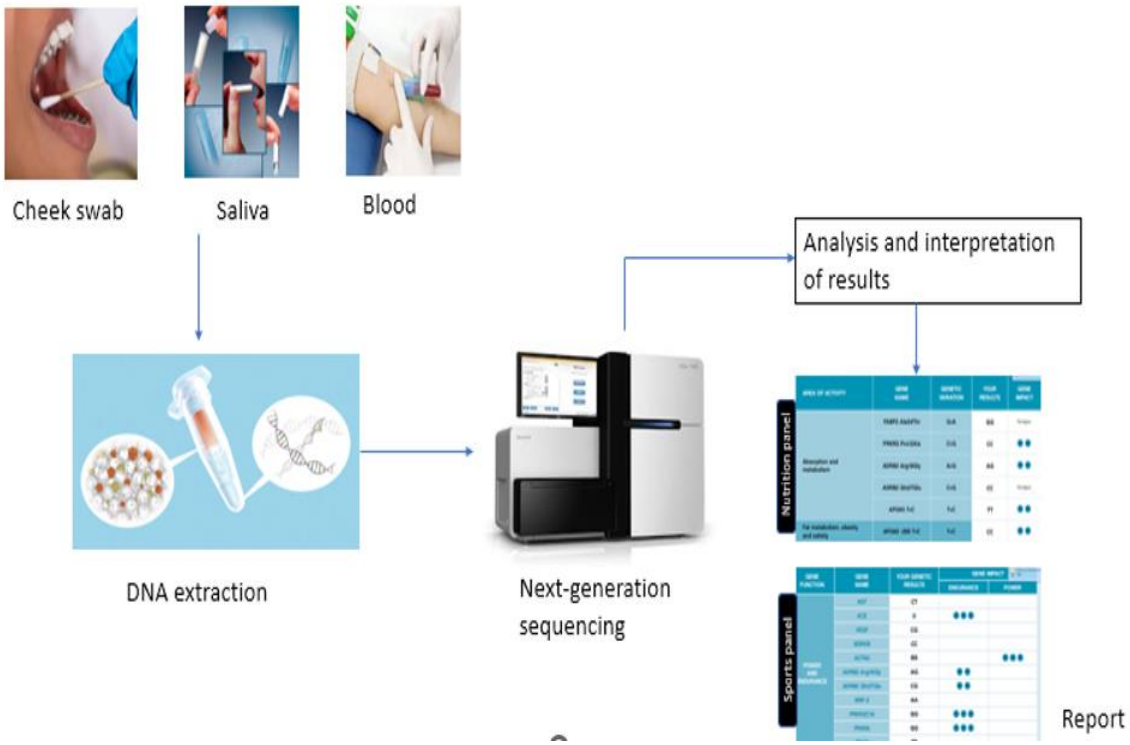


Development of the workflow for nutrigenetic testing

Steps involved in Sample collection

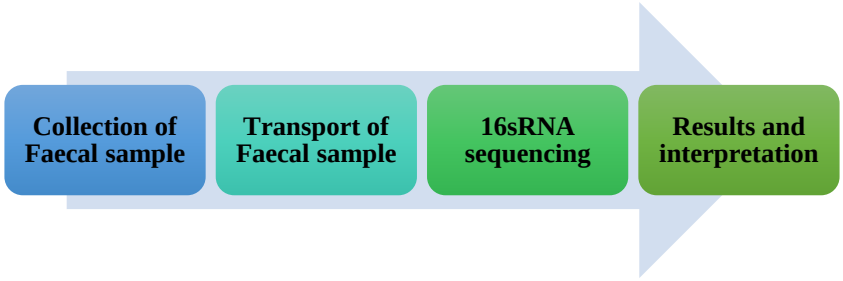


Step by Step Illustration of Workflow of Nutrigenetic Testing

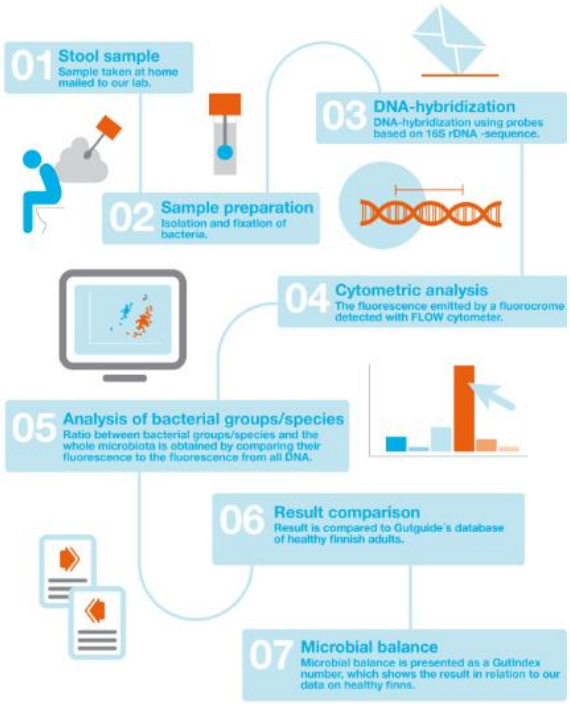


Development of the workflow for gut microbiome testing

Steps involved in Sample Collection



Step by Step Illustration of Workflow of gut microbiome testing



Evaluation of the efficacy of precision nutrition based dietary advice on long term weight loss

Statistical Analysis & Interpretation

iv) Findings:

- In survey conducted to know the consumer acceptance of genetic testing for personalized nutrition, almost 48% of the participants were males and 52% were females.
- The mean age of the participants was 38.3 ± 14.9 years. Majority of the participants were from the age group between 40- 49 years.
- Majority of the participants held a post graduate degree (n=181, 36.2%) and professional degree (n= 174, 34.8 %).
- Nearly 36% of the study participants had a university post- graduation degree and 34.8% had professional degree. Most of the participants had business as their occupation (33.4%) and 25.2% were working in private sectors.

- People were more inclined to follow a personalised diet based on their genetic makeup if they had diagnosed hypertension ($p = 0.02$), diagnosed type 2 diabetes ($p = 0.03$), and obesity ($p = 0.04$) and if they had diagnosed heart ailments ($p = 0.01$).
- More than 85% of participants who were diagnosed with type 2 diabetes reported to be willing to follow the dietary recommendations based on their genetic makeup.
- The participants who had any medical history or having any current medical condition were compared with those who did not have any medical history. Those who were willing to undergo a genetic test for a personalised diet were 1.34 times more likely to report obesity, 1.25 times more likely to report high blood pressure. Males were more likely to report their willingness to take the test done to follow a personalised diet.
- When asked about the perceived advantages of receiving DNA based dietary advice, ease of understanding and specificity of the diet advice was the most frequently reported theme (57.5%), followed by more personalised and enjoyable (22.4%) and reduced costs due to disease prevention (20.1%).
- Additionally, 23.5% of the study participants perceived no disadvantage to receiving DNA based dietary advice. And about the disadvantages, "adds cost by advising to consume specific foods (45.7)% was the most frequently mentioned disadvantage followed by "personalised nutrition is much more time consuming" (34.3%) and non- feasibility and difficulty to prepare different foods for different family members (20%).
- Nearly, 31.2% of respondents feels confident that genetic test-based personalized nutrition helps them to have full control of their health and see it as an attractive option, while nearly 27.6% feels genetic based personalised nutrition has lot of risks. Nearly 28.2% of them believes that it could help them prevent diseases.
- Three statements were included in the survey to assess motivations to adopt personalised nutrition advice based on genetic testing in order to determine their perceptions of these statements to understand the underlying motivation factors. The most commonly selected response among the 500 participants was 'personalised nutrition could help disease prevention' (57%), followed by 'can see more of benefits over drawbacks of genetic based personalised nutrition" (56.4%) and 'personalised nutrition makes me able to live longer in good health' (52%).
- The response options used in the questionnaire, 'personalised nutrition makes me able to live

longer in good health' (Mean response ± SD, 4.17 ± 1.05), 'personalised nutrition can help disease prevention' (Mean response ± SD, 4.43 ± 0.79) and 'If I weigh up the benefits and drawbacks of genetic based personalised nutrition, I can see more of benefits (Mean response ± SD, 3.98 ± 1.05).

- Almost, 80% strongly agreed that they were very capable of providing personalised nutrition advice.Participants assessed the service provider's knowledge and skills about personalized nutrition advice, with 0.4% strongly disagreeing, 0.6% disagreeing, 5% neither agreeing nor disagreeing, 30% agreeing, and 64.2% strongly agreeing.
- Participants indicated opinions on the availability of easily understandable information in the personalized nutrition report, with 0.6% strongly disagreeing, 2.4% disagreeing, 10.4% neither agreeing nor disagreeing, 16.6% agreeing, and 70% strongly agreeing.
- Concerning the health care provider's education and time, 0.2% strongly disagreed, 1% disagreed, 2% neither agreed nor disagreed, 40.2% agreed, and 56.6% strongly agreed that there was a lack of adequate education and time.
- Participants expressed opinions on the agreement and accountability of service providers, resulting in 0.6% strongly disagreeing and 74.8% strongly agreeing.
- A substantial 82% of the respondents strongly agree that they benefit from personalized nutrition advice in daily life, showcasing a significant positive response. Similarly, 77.4% strongly agree that their families also benefit from personalized nutrition advice, indicating a high level of perceived utility among participants

- Notably, 86.4% of them strongly agree that gene-based dietary advice has helped them prevent diseases, highlighting the potential health impact of such personalized approaches.

- A noteworthy 77.2% strongly agree that they still follow their previous diet habits to the greatest possible degree, complementing it with personalized food and supplements, underscoring the integration of personalized recommendations into existing dietary practices.

- Regarding the emotional aspect, 56.4% strongly agree that knowing about their personalized nutrition test results caused some anxiety, emphasizing the need for thoughtful communication and support in delivering such information.

- Significantly, a vast majority (70.8%) strongly disagree that personalized nutrition puts restrictions on cultural dietary habits, indicating a general acceptance and adaptability to these recommendations within cultural contexts.

- Participants were asked to indicate which health care provider disseminated the information related to genetic test and personalised nutrition recommendations. The response options were 'registered dietitian', 'physician', 'genetic counsellor', 'other', and participants were asked to choose the source of information provider. The selected responses were 'registered dietitian' (56%), followed by 'physician' (27%), 'genetic counsellor' (14%) and 'other' (3%).
- More than a third of respondents, n=186 (37.2 %) had the intention to adopt personalised nutrition recommendations in their daily life. While 28.4 % (n = 142) of them responded that they will definitely adopt personalised nutrition recommendations.

Examiners

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