



EFFECT OF SKIPPING MEALS ON NUTRITIONAL STATUS (BMI) OF INDIVIDUALS (20-40 YEARS)

¹Ms. More Aishwarya and ²Dr. (Mrs.) Shekar Anuradha

¹ Student of M.Sc (Clinical Nutrition and Dietetics), Dr. Bhanuben Mahendra Nanavati College Of Home Science, S.N.D.T Women's University,338, Rafi Ahmed Kidwai Road, Matunga, Mumbai-400019.

² Associate Professor and Vice Principal, Department of Food Science and Nutrition, Dr. Bhanuben Mahendra Nanavati College Of Home Science, S.N.D.T Women's University,338, Rafi Ahmed Kidwai Road, Matunga, Mumbai-400019.

Abstract:

Aim: To assess the effect of skipping meals on nutritional status of individuals both males and females 20 - 40 years.

Objective: 1)To assess nutritional status using anthropometric measurements. 2) To assess the nutritional status using 24 hour recall method. 3) To assess the dietary patterns, sleep patterns, medical history, reproductive health and physical activity of both the groups. 4) To observe the effect of skipping meals on various factors.

Methods: The study was conducted in Mumbai. Purposive convenience sampling method was used for the participants both males and females in the age group of 20 - 40 year. Total sample size was 70. Tool used were 24hr Dietary recall method. Anthropometric measurement like current weight, height, body mass index (BMI), waist to hip ratio (W/H) were collected and analyzed using WHO criteria. The data collected was coded using statistical analysis tool. Analyses were performed using SPSS software version 20. $P < 0.05$ was considered to be statistically significant.

Results and discussion: In this study 43 females and 27 males were included, in which 82.9% samples belonged to nuclear family. Majority of the samples were found to be graduates (50%) who majorly belonged to high socio- economic status (52%). The BMI of the samples was found to be falling in obese category 48.6%.Waist-Hip ratios revealed that, females had a higher risk (38.6%) of metabolic complications compared to males. It was observed that the BMI increases when the samples skipped meals and showed a positive correlation at ($p = 0.00$). Samples who ate less than 3 meals in a day showed higher BMI (26.15 ± 2.8) compared to those who had more than 3 meals in a day. These two parameters showed positive correlation among them. ($p = 0.027$).

Conclusion: In the present study it can be concluded that less than 3 meals in a day and intake of less calories from food increases the individuals BMI.

Keywords: Skipping meals, BMI, 24hr dietary recall.

I. INTRODUCTION

The rate of meal skipping in the young adult population vary between 24% and 87%, with young adults consistently reporting higher rates of meal skipping. The data from Australian Health Survey 2011 showed that 39% of Australian young adults reported eating breakfast less than 5 days per week, compared with 10% children and 33% of all adults. It was reported in 12 studies with prevalence ranging between 5% and 83%. In 25 studies meals with breakfast the most frequently skipped meal 14–88% compared to lunch and dinner⁽¹⁾. Skipping meals is particularly common during adolescence and can have effect on multiple aspects of adolescent health⁽²⁾. Skipping meals was associated with a low-quality diet, low consumption of fruits and vegetables and a high intake of sodium and calories from solid fats, added sugars. The adoption of regular meal habits may help adolescents improve their diet quality⁽³⁾. Meal skipping was associated with decreased energy intake, and was linked to increased calories per eating occasion and higher triglycerides and visceral adipose tissue, which are strong indicators of deleterious metabolic profiles and may be associated with increased visceral adipose tissue and related metabolic diseases in high-risk⁽⁴⁾. Meal frequency irregularity leads to a lower postprandial energy expenditure compared with the regular meal frequency, while the energy intake was not significant⁽⁵⁾. Eating breakfast regularly decrease BMI compared with breakfast skippers. Consuming largest meal was breakfast experienced the largest relative decrease in BMI compared with those who ate their largest meal at dinner, and those who ate lunch as the largest meal experienced a smaller relative decrease in BMI⁽⁶⁾. The influence of the body mass index (BMI) between breakfast skipping and risk of type 2 diabetes, provides evidence that breakfast skipping is associated with an increased risk of type 2 diabetes, and the association is mediated by BMI⁽⁷⁾. An unbalanced diet due to excessive or inadequate intake of calories or other nutrients is closely related to a higher prevalence of overweight and obesity, while a balanced diet should provide adequate energy, macro- and micro-nutrients⁽⁸⁾. Omission of breakfast has been seen to decrease daily energy and nutrient intake and is a risk factor for lower muscle mass in healthy young subjects, irrespective of strong confounders, such as age, sex, and physical activity⁽⁹⁾. An unbalanced diet due to excessive or inadequate intake of calories or other nutrients is closely related to a higher prevalence of overweight and obesity, while a balanced diet should provide adequate energy, macro- and micro-nutrients⁽¹⁰⁾.

II. RESEARCH METHODOLOGY

The research proposal was approved by the institutional ethical committee of Dr BMN College of Home Science. The study was conducted in Mumbai. Purposive convenience sampling method was used for the participants both males and females in the age group of 20 - 40 year. Total sample size was 70. Tool used were 24hr Dietary recall method. Anthropometric measurement like current weight, height, body mass index (BMI), waist to hip ratio (W/H) were collected and analyzed using WHO criteria.

Energy, Protein, Fats, Carbohydrate, Iron and Fiber were calculated according to nutritive value of Indian foods IFCT (2019). Analyses were performed using SPSS software version 20. $P < 0.05$ was considered to be statistically significant. Descriptive statistics were used to determine means and standard deviation, while correlation coefficients were used for analyzing and interpreting the data to enable inferences.

III. STATISTICAL TOOLS

Analyses were performed using SPSS software version 20. Data was presented as Mean \pm SD, median (minimum-maximum) and percentage. The frequency distributions were tabulated for various parameters and were compared using cross tabulations and chi-square test. Pearson's chi square correlation was used to find correlation between BMI and meal skipping. $p < 0.05$ was considered to be statistically significant.

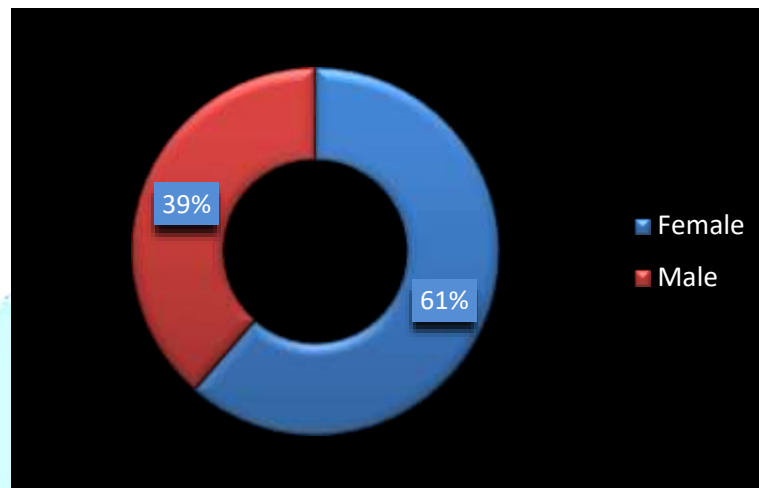
IV. RESULTS AND DISCUSSION:

The study was carried out on 70 samples of age group 20 – 40 years. Both female and male were included in the study.

a. Gender of the samples:

Both Males and Females were included in the study. It was observed that highest respondents of 61% were Females and rest 39% were Males.

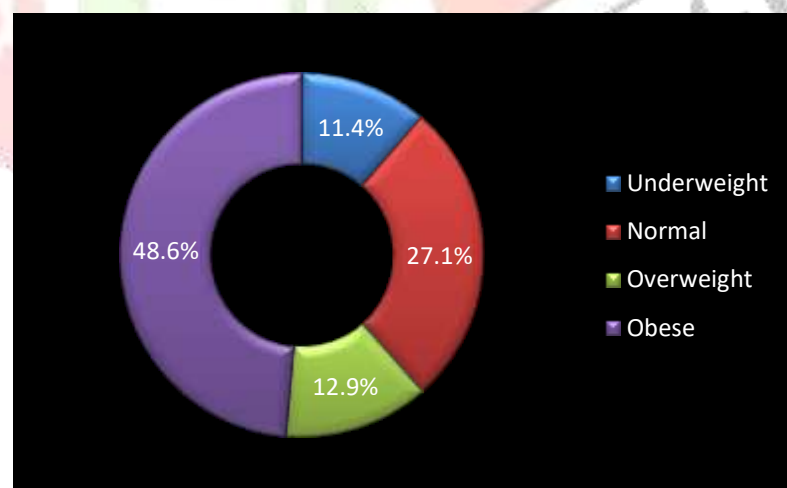
Figure 1: Gender of the samples



b. BMI of the samples:

The figure depicts that 48.6% belonged to obese category, 27.1% were normal followed by 12.9% who were overweight and 11.4% observed were in underweight category.

Fig 2: BMI of the samples



Correlations:

- a. Correlation between BMI and Food Intake:

Table 1: Correlation between BMI and Food Intake

| BMI Category | Energy | Carbohydrate |
|--------------|-----------------|--------------|
| | Mean ± S.D | Mean ± S.D |
| Underweight | 1311.6 ± 1311.6 | 174.1 ± 43.9 |
| Normal | 1311.6 ± 297.3 | 134.1 ± 46.7 |
| Overweight | 924.0 ± 115.2 | 107.9 ± 16.0 |
| Obese | 803.3 ± 191.3 | 98.0 ± 26.0 |
| F | 11.34 | 12.69 |
| P | .000 | .000 |

The above table depicts the correlation between Energy and Carbohydrate intake and BMI category. Consumption of energy and carbohydrate shows positive correlation between them at p value 0.000 which can be interpreted that due to less consumption of food there was increase in the BMI leading to obesity in the individual.

Total energy intakes of three major nutrients (g/day) and energy intake ratio from protein and fat (%) increased as BMI increased, whereas energy intake ratio from carbohydrate decreased. Energy intake ratio from carbohydrate and fat decreased as BMI increased in women. Body mass index and total energy intake showed positive relationship⁽¹¹⁾. Obesity prevalence has increased rapidly worldwide. Carbohydrates are among the macronutrients that provide energy and can thus contribute to excess energy intake and subsequent weight gain. Sugar-sweetened beverages do not induce satiety to that extent as solid forms of carbohydrate, and that increases in sugar-sweetened soft drink consumption are associated with weight gain⁽¹²⁾. Major health consequences are related with obesity including heart disease, stroke, type 2 diabetes, and increased risk for certain types of cancer. Excessive weight gain is primarily attributed to a persistent positive energy balance where calories consumed exceed calories expended. Food craving was positively correlated with initial calories and negatively correlated with change in food cravings and change in calories. Additionally, change in calories was positively associated with change in cravings⁽¹³⁾.

- c. Correlation between BMI and Meal frequency

Table 2: Correlation between BMI and Meal frequency

| Meals in a day | BMI |
|-------------------|-------------|
| | Mean ± S.D |
| Less than 3 meals | 26.15 ± 2.8 |
| 3 meals | 23.16 ± 4.3 |
| 4 meals | 23.42 ± 3.2 |
| More than 4 meals | 23.85 ± 3.1 |
| F | 3.253 |
| P | .027 |

The above table shows the correlation between meals in a day and BMI category and the frequency of meals has shown a positive correlation between them at p value 0.027 which can be interpreted that consumption of less than 3 meals in a day leads to increase in the BMI category of the individuals.

Meal skipping increased energy expenditure than consuming 3 meals a day. Increased insulin concentrations and fat oxidation with breakfast omission suggested development of metabolic disease in response to prolonged long term fasting may lead to impaired glucose homeostasis⁽¹⁴⁾. Meal skipping was associated with decreased energy intake, and was linked to increased calories per eating occasion and higher triglycerides and visceral adipose tissue, which are strong indicators of deleterious metabolic profiles and may be associated with increased visceral adipose tissue and related metabolic diseases in high-risk⁽⁴⁾. Irregular meal consumption was seen with higher prevalence of the metabolic syndrome but was explained by concurrent unhealthy lifestyle. Poor breakfast was the only meal associated with the metabolic syndrome, independent of other meals, and lifestyle⁽¹⁵⁾.

Conclusion:

In the present study, it was observed that BMI increases when the samples skipped meal and had a positive correlation between them at p value = 0.00, due to increased BMI they were in the obese category which may lead to further metabolic complications. Samples who ate less than 3 meals in a day showed higher BMI (26.15 ± 2.8) compared to those had more meals in a day. These two parameters showed positive correlation among them at p = 0.027. From this it can be concluded that less than 3 meals in a day and skipping meals increases the individuals BMI. The samples should be encouraged and motivated to increase the frequency of meals which will provide all nutrients and will reduce further metabolic complications.

References:

1. Felicity J. Pendergast, Katherine M. Livingstone, Anthony Worsley and Sarah A. Mc Naughton (2016). Correlates of meal skipping in young adults: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity* volume 13, 125 <https://doi.org/10.1186/s12966-016-0451-1>
2. Natalie Pearson, Lauren Williams, David Crawford and Kylie Ball.,(2012). Maternal and best friends' influences on meal-skipping behaviours. *British Journal of Nutrition, Volume 108, Issue 5* ; pp. 932-938. doi: 10.1016/j.nutres.2018.09.006.
3. Paulo Rogerio Melo Rodrigues Ronir., Raggio Luiz Ph.D., Luana Silva Monteiro Ph.D., Marcia Goncalves Ferreira Ph.D., Regina Maria Veras Goncalves Silva Ph.D., Rosangela Alves Pereira Ph.D. (2017). Adolescents unhealthy eating habits are associated with meal skipping. *Nutrition.; Volume 42, Pages 114-120.e1*. <https://doi.org/10.1016/j.nut.2017.03.011>
4. Benjamin T. House, Lauren T. Cook, Lauren E. Gyllenhammer, Jeremy M. Schraw, Michael I. Goran, Donna Spruijt Metz, Marc J. Weigensberg, and Jaimie N. Davis (2013). Meal Skipping linked to Increased Visceral Adipose Tissue and Triglycerides in Overweight Minority Youth. *Obesity (Silver Spring); 22(5): E77–E84*. doi: 10.1002/oby.20487
5. H R Farshchi, M A Taylor & I A Macdonald (2004). Decreased thermic effect of food after an irregular compared with a regular meal pattern in healthy lean women. *International Journal of Obesity* volume 28, pages 653–660. <https://doi.org/10.1038/sj.ijo.0802616>
6. Hana Kahleova, Jan Irene Lloren, Andrew Mashchak, Martin Hill, Gary E Fraser (2017). Meal Frequency and Timing Are Associated with Changes in Body Mass Index in Adventist Health Study 2. *The Journal of Nutrition, Volume 147, Issue 9, September 2017, Pages 1722–1728*, <https://doi.org/10.3945/jn.116.244749>

7. Ballon A, Neuenschwander M, and Schlesinger S,(2019). Breakfast Skipping Is Associated with Increased Risk of Type 2 Diabetes among Adults: A Systematic Review and Meta-Analysis of Prospective Cohort Studies. *J Nutr.* ;149(1):106-113. doi: 10.1093/jn/nxy194.
8. Herrera H, Rebato E, Arechabaleta G, Lagrange H, Salces I & Susanne C (2003). Body mass index and energy intake in Venezuelan University students. *Nutr Res* 23(3): 389–400.
9. Yasuda J, Asako M, Arimitsu T, and Fujita S, (2018). Skipping breakfast is associated with lower fat-free mass in healthy young subjects: a cross-sectional study. *Nutr Res.* ; 60:26-32. doi: 10.3945/ajcn.116.151332.
10. Herrera H, Rebato E, Arechabaleta G, Lagrange H, Salces I & Susanne C (2003). Body mass index and energy intake in Venezuelan University students. *Nutr Res* 23(3): 389–400.
11. Yoshita K, Arai Y, Nozue M, Komatsu K, Ohnishi H, Saitoh S, Miura K; NIPPON DATA80/90 Research Group.(2010). Total energy intake and intake of three major nutrients by body mass index in Japan: NIPPON DATA80 and NIPPON DATA90. *J Epidemiol.* 20 Suppl 3:S515-23. Doi: 10.2188/jea.je20090219
12. R M van Dam & J C Seidell(2007). Carbohydrate intake and obesity. *European Journal of Clinical Nutrition* volume 61, pagesS75–S99 <https://doi.org/10.1038/sj.ejcn.1602939>
13. Joanna Buscemi, Tiffany M. Rybak, Kristoffer S. Berlin, James G. Murphy, and Hollie A. Raynor (2017). Impact of food craving and calorie intake on body mass index (BMI) changes during an 18-month behavioral weight loss trial. *J Behav Med.*; 40(4): 565–573. doi: 10.1007/s10865-017-9824-4
14. Nas A, Mirza N, Hägele F, Kahlhöfer J, Keller J, Rising R, Kufer TA, and BosyWestphal A, (2017). Impact of breakfast skipping compared with dinner skipping on regulation of energy balance and metabolic risk. *Journal of Clinical Nutrition*,105(6),1351-1361. DOI: <https://doi.org/10.1017/S0007114599001348>
15. Wennberg M, Gustafsson PE, Wennberg P, Hammarström A. (2016). Irregular eating of meals in adolescence and the metabolic syndrome in adulthood: results from a 27-year prospective cohort. *Public Health Nutr.* ;19(4):667-73. doi: 10.1017/S1368980015001445.