DYSFUNCTION IN HYPOTHALAMIC SIGNALING CONTRIBUTES TO ABNORMAL APPETITE CONTROL AND WEIGHT GAIN : STUDY IN PHASE I MBBS AS RISK FACTOR FOR OBESITY AND CARDIAC DISEASES.

DR. ANITA M. RAUT . * , DR. NILESH V. KODRE . **, DR. DHANANJAY V. ANDURE

* Associate Professor, Dept of Biochemistry DVVPF'S Medical College,Ahilyanagar

** Associate Professor, Dept of Medicine DVVPF'S Medical College,Ahilyanagar
*** Professor Dept. of Biochemistry DVVPF'S Medical College,Ahilyanagar

Corresponding Author-
Dr. Anita M.Raut
Associte Professor
Dept of Biochemistry DVVPF'S Medical College,Ahilyanagar
Email: anitaraut009@gmail.com
Mobile- 7276213047

Abstract:

Background:

Cardiovascular diseases (CVDs) are leading causes of morbidity and mortality globally, with dyslipidemia and obesity playing pivotal roles in their pathogenesis. Early detection of lipid abnormalities and unhealthy dietary patterns in young adults may provide insight into future cardiovascular risk.

Methods:

A cross-sectional study was conducted on 160 Phase 1 MBBS students aged 18–22 years. Based on BMI, participants were grouped into two: Group A (100 healthy students, BMI <24.9 kg/m²) and Group B (60 obese students, BMI ≥25 kg/m²). Fasting triglyceride levels were measured biochemically.

Results:

Mean BMI in Group A was 22.1 ± 1.6 kg/m², while in Group B it was 29.4 ± 2.8 kg/m².

Mean fasting triglyceride levels were significantly higher in Group B (178.2 ± 24.3 mg/dL) compared to Group A (124.6 ± 18.7 mg/dL) ($p<0.001$).

Discussion:

Obese students demonstrated significantly altered dietary habits and elevated triglyceride levels, suggesting an increased risk for future cardiovascular complications.

Conclusion:

There is a strong association between poor dietary practices, elevated triglyceride levels, and increased BMI among Phase 1 MBBS students. Promoting awareness about healthy eating habits and periodic screening of lipid profiles,could help in early identification and prevention of obesity-related cardiovascular diseases.

Keywords:

Triglycerides, BMI, Dietary Patterns, MBBS Students, Obesity, Cardiovascular Risk

Introduction:

The increasing burden of obesity and cardiovascular diseases (CVDs) among the youth, particularly in medical students who often face academic stress and irregular eating patterns, necessitates an evaluation of early metabolic risk indicators. Triglyceride levels, when elevated, serve as independent risk factors for atherosclerosis and cardiac disease. This study aimed to analyze the impact of diet on triglyceride levels and BMI in a cohort of Phase 1 MBBS students.

The hypothalamus is the central regulator of energy balance, integrating neural, hormonal, and nutrient signals to control.Hunger and satiety,Body weight,Energy expenditure

Normal Hypothalamic Signaling Pathways

1-Appetite-stimulating Pathway -Activated during fasting: Increases food intake Decreases energy expenditure

2. Appetite-suppressing Pathway-Activated after feeding,reduces appetite- increases energy expenditure

Dysfunction of Hypothalamus Leads to Abnormal Appetite & Weight Gain:

1. Leptin Resistance -Common in obesity, hypothalamus fails to respond
Persistent hunger and overeating

2. Insulin Resistance in the Brain-Impaired insulin signaling .Failure to suppress appetite Increased caloric intake

3-Hypothalamic Inflammation-Caused by high-fat diet Progressive weight gain

4-. Structural Damage to Hypothalamus-Seen in:-Craniopharyngioma,Trauma

Thus Hypothalamic obesity is rapid, severe, treatment-resistant (1)

Obesity and cardiovascular diseases remain leading public health challenges worldwide, with their prevalence continuing to rise due to modifiable lifestyle factors such as poor diet, physical inactivity, and chronic stress . Among the various biochemical markers associated with these conditions, elevated serum triglyceride levels have been identified as a key indicator of increased cardiovascular and metabolic risk (2). Triglyceride elevation, often a consequence of high dietary fat and refined carbohydrate intake, plays a pivotal role in the pathogenesis of atherosclerosis and obesity-related complications (3).

Medical students, especially those in the early years of training, represent a unique population exposed to high academic demands, erratic schedules, and lifestyle disruptions, which may predispose them to unhealthy dietary behaviors and sedentary habits . Despite their medical knowledge, these students often neglect personal health maintenance, potentially increasing their long-term risk of non-communicable diseases (4).

This study aims to investigate the interrelationship between dietary practices, serum triglyceride levels, and the risk of obesity and cardiac diseases among Phase I MBBS students. By focusing on this formative stage of medical education, the research seeks to identify emerging patterns of health risk that may warrant early intervention. Understanding these dynamics is crucial not only for safeguarding the well-being of future physicians but also for bringing up a more health-conscious medical workforce.

Ultimately, this could translate into improved patient care and a more resilient healthcare system (5,6).

Aims and Objective:

To evaluate triglyceride levels, dietary habits, and Body Mass Index (BMI) among Phase 1 MBBS students, comparing 100 healthy subjects with 60 obese individuals to explore correlations with early markers of cardiovascular risk.

Material and Methods-

Study Design:

A cross-sectional observational study was conducted among Phase I MBBS students to assess their dietary patterns, triglyceride levels, and associated risk factors for obesity and cardiac disease.

Study Setting and Duration:

The study was carried out in a DVVPF'S Medical College ,Ahilynagar was conducted over a period of 3 months, targeting students in the first year of the MBBS course.Study was cleared by institutional ethics committee .

Study Population:

Inclusion Criteria:

1-First-year MBBS students who provide written informed consent.

2-Students without known chronic metabolic or cardiac diseases and non smokers .

Exclusion Criteria:

1-Students on lipid-lowering medication.

2-Students with pre-existing diagnosed endocrine, hepatic, or cardiac conditions.

Sample Size:

Participants: 160 students aged 18–20 years.,Group A: 100 healthy (BMI <24.9) ,Group B: 60 obese (BMI ≥25) . included using convenience sampling, based on feasibility and availability during the academic term. Fasting blood samples were collected in plain red cap evacuated tubes and were analyzed on the same day of collection in the Dept. of Biochemistry .

Table No- 1

Sr. no.	Group	Types	No. of Subjects
1.	Group I l	Healthy Subjects	100
3.	Group II	Obese Students	60

Data Collection Tools and Techniques:

1. **Questionnaire:**
   A pre-validated, structured questionnaire was used to collect data:

   1-Demographic details

   2-Dietary habits (frequency, type of meals, snacking, etc.)

3-Physical activity levels

3-Sleep duration and quality

4-Stress levels using a standard tool (e.g., Perceived Stress Scale)

2-Parameters-

1- BMI calculated as weight (kg)/height (m^2).

2-Blood samples for Sr.triglyceride levels were measured using enzymatic colorimetric method.(7).

3-Dietary habits evaluated via structured FFQ assessing meal frequency, fast food, fried and sugary items.

Statistical Analysis: Data analyzed using SPSS. $p<0.05$ considered significant.

Result-

Table No. 2 - Showing Correlation with TG and BMI

S.No.	Parameters	Group A (Healthy)	Group B (Obese)
1	Mean BMI (kg/m^2)	22.1 ± 1.6	29.4 ± 2.8

2	**Mean Triglycerides (mg/dL)**	**124.6 ± 18.7**	**178.2 ± 24.3**
3	**Junk food >3x/week**	**28%**	**72%**
4	**Skipping breakfast**	**25%**	**60%**
5	**Late-night snacking**	**18%**	**58%**

A positive correlation (r = 0.61) was observed between BMI and serum triglyceride levels.

Discussion:

From the Table no. 2

Our findings support a significant relationship between high BMI, elevated triglyceride levels, and poor dietary habits in obese students. The tendency toward energy-dense, low-nutrient foods and irregular meal timing contributes to dyslipidemia. These behaviors, if unchecked, can track into adulthood, increasing lifelong cardiovascular risk.

The present study highlights a significant association between elevated body mass index (BMI), increased triglyceride levels, and poor dietary habits among obese Phase 1 MBBS students when compared to their healthy individuals . The mean BMI in the obese group (Group B) was 29.4 ± 2.8 kg/m², markedly higher than the healthy group (Group A), which had a mean BMI of 22.1 ± 1.6 kg/m². Similarly, the mean triglyceride level in Group B (178.2 ± 24.3 mg/dL) was statistically elevated as

compared to Group A (124.6 ± 18.7 mg/dL), indicating a clear trend toward dyslipidemia in the obese cohort (8,9).

Dietary behavior patterns further underscore the metabolic imbalance in the obese group. A significantly higher proportion of students in Group B reported consuming junk food more than three times per week (72% vs. 28%), skipping breakfast (60% vs. 25%), and engaging in late-night snacking (58% vs. 18%). These behaviors reflect a consistent pattern of high-calorie, low-nutrient intake and irregular meal timing—factors known to disrupt metabolic homeostasis and lipid metabolism (10,11).

Frequent consumption of processed and energy-dense foods rich in saturated fats and simple carbohydrates is strongly linked to elevated serum triglyceride levels and increased adiposity (12). Skipping breakfast, a habit prevalent in the obese group, has been associated with increased hunger later in the day, leading to overeating and poor food choices (13). Likewise, late-night snacking contributes to higher total daily energy intake and may interfere with circadian rhythms, further impairing lipid and glucose metabolism (14).

These findings are consistent with previous studies indicating that unhealthy dietary habits are modifiable risk factors for obesity alter the hypthylamus signal and associated metabolic disorders (15). The clustering of poor eating habits among medical students is particularly concerning, as this group is expected to serve as future health advocates. If such behaviors are not corrected early, they are likely to persist into adulthood, significantly increasing the risk of cardiovascular diseases, type 2 diabetes, and other chronic health conditions (16,,17).

In light of these observations, it is imperative to emphasize the role of preventive strategies, including dietary education, lifestyle counseling, and institutional support systems. Promoting regular, balanced meals and discouraging the consumption of processed and high-fat foods can play a vital role in curbing the early onset of obesity-related complications (18). Furthermore, encouraging a culture of health-conscious behavior among medical students may have a broader impact, enabling them to better advocate for patient lifestyle modifications in their future clinical practice (19.20).

Conclusion and Recommendations:

The equilibrium between appetite suppressing pathway is upset by hypothalamic signaling ,which results in poor satiety signaling ,increased food intake ,decreased energy expenditure and eventually weight gain. The results of this study highlight the significant correlation among obese Phase I M BBS students between poor dietary practices, high triglyceride levels, and raised B MI.

These patterns show early metabolic disorders that could be signs of more serious ill nesses such insulin resistance, dyslipidemia, and cardiovascular diseases. Given their future role as healthcare professionals, the significant incidence of unhe althy eating habits among medical students—such as frequent junk food consumption, skipping breakfast, and late-night snacking—is especially alarming.

It is crucial to identify these risk factors as soon as possible in this population that h as both lifestyle and academic challenges. To foster a culture of self-care and preventative health, medical education curricula should incorporate interve ntions that support stress management, regular exercise, and a nutritious diet. In addition to improving medical students' immediate health and academic performa nce, taking preemptive measures to address these concerns prepares them to model a nd promote healthy practices in their future clinical practice.

In the end, encouraging wellness among medical students helps create a more resilie nt and health-conscious medical staff, which has long-term advantages for public health.

Recommendations:

1-Regular health screenings for triglycerides and BMI.

2-Inclusion of nutritional counseling in the MBBS curriculum.

3-Promotion of physical activity and stress management.

Acknowledgement-

We sincerely thank the management and the Department of Biochemistry for their valuable support and for providing the necessary facilities essential for the successful completion of this study.

We also extend tour heartfelt appreciation to the Phase I MBBS students for their willing participation and generous cooperation throughout the research.

Conflict of interest-

No any conflict of interest

References -

1-Ahima RS, Lazar MA. Adipokines and the peripheral and neural control of energy balance. *Mol Endocrinol*. 2008;22(5):1023–1031.

2-Sarwar N, Danesh J, Eiriksdottir G, et al. Triglycerides and the risk of coronary heart disease. Circulation. 2007;115(4):450–458.

3-Nordestgaard BG, Varbo A. Triglycerides and cardiovascular disease. Lancet. 2014;384(9943):626–635.

4-Gupta S, Ray TG, Saha I. Overweight and obesity and lifestyle of medical students. Indian J Community Med. 2009;34(3):255–257.

5-Frank E, Carrera JS, Elon L, Hertzberg VS. Predictors of US medical students' prevention counseling practices. Prev Med. 2007;44(1):76–81.

6-Lobelo F, Duperly J, Frank E. Physical activity habits of doctors and medical students influence their counseling practices. Br J Sports Med. 2009;43(2):89–92.

7-Schettler G.E. Nissel(1995)Arbeitsmed Sozialmed Praventimed 10:25

8-Grundy SM. Metabolic syndrome update. Trends Cardiovasc Med. 2016;26(4):364–373.

9-Després JP. Body fat distribution and risk of cardiovascular disease: An update. Circulation. 2012;126(10):1301–1313.

10-Kant AK. Reported consumption of low-nutrient-density foods by American children and adolescents: nutritional and health correlates, NHANES III. Eur J Clin Nutr. 2003;57(7):871–881.

11-Pereira MA, Kartashov AI, Ebbeling CB, et al. Fast-food habits, weight gain, and insulin resistance (the CARDIA study). Lancet. 2005;365(9453):36–42.

12-Taha S, Ahmed E, Abo-Elmagd B. Effect of dietary fat and carbohydrate content on serum lipid profile. J Adv Biomed & Pharm Sci. 2018;1(2):89–94.

13-Timlin MT, Pereira MA. Breakfast frequency and quality in the etiology of adult obesity and chronic diseases. Nutr Rev. 2007;65(6 Pt 1):268–281.

14-Almoosawi S, Prynne CJ, Hardy R, et al. Time-of-day and nutrient composition of eating occasions: prospective association with the metabolic syndrome in the 1946 British birth cohort. Int J Obes (Lond). 2013;37(5):725–731.

15-Reutrakul S, Knutson KL. Consequences of circadian disruption on cardiometabolic health. Sleep Med Clin. 2015;10(4):455–468.

16-Van Dam RM, Seidell JC. Carbohydrate intake and obesity. Eur J Clin Nutr. 2007;61 Suppl 1:S75–S99.

17-Bhadoria AS, Sahoo K, Sahoo B, et al. Childhood obesity: causes and consequences. J Family Med Prim Care. 2015;4(2):187–192.

18-Hu FB. Resolved: there is sufficient scientific evidence that decreasing sugar-sweetened beverage consumption will reduce the prevalence of obesity and obesity-related diseases. Obes Rev. 2013;14(8):606–619.

19-Kearney J. Food consumption trends and drivers. Philos Trans R Soc Lond B Biol Sci. 2010;365(1554):2793–2807.

20-Frank E, Tong E, Lobelo F, et al. Physical activity levels and counseling practices of U.S. medical students. Med Sci Sports Exerc. 2008;40(3):
