

*Research Paper***Role of Dietary Fat Intake in Obesity and Its Association with Mental Health Among Adults of the University of Lahore: A Cross-Sectional Study**

Umaima Akhtar ^{1*}, Tabeen Irfan ^{1*}, Wania Rafi ¹, Iqra Asghar ¹, Momina Shehzadi ¹, Laiqa Gull ¹, Eshaal Amin ¹

¹ Department of Human Nutrition and Food Technology, Faculty of Allied Health Sciences, Superior University Lahore, Pakistan

***Corresponding authors:** Umaima Akhtar (umaimaakhtar81@gmail.com), Tabeen Irfan (Tabeen.irfan@superior.edu.pk)

Abstract: Fat in the diet is a vital macronutrient, which supplies energy and effects on body weight, chronic conditions and psychological health. The purpose of the current study was the relationship between food intake of fat and obesity risks with mental health of normal weight and underweight university students who may be at risk for obesity in later life. In this study, 271 adult participants (age range 18-35 years) were recruited using convenience sampling for the descriptive cross-sectional study of 4 months period in the University of Lahore. Data were collected through a structured self-administered questionnaire assessing dietary fat intake, body mass index (BMI), physical activity, eating habits, eating patterns, and psychological well-being. Most participants had a normal BMI (165/271, 60.9%), while 58 (21.4%) were underweight. Although the majority of children were not overweight, amongst the majority, they exhibited a variety of unhealthy eating habits such as late-night eating and food avoidance, including eating fatty foods, eating fat foods after foods were eaten, and feeling guilty after eating fat foods. The females were significantly more anxious than the males ($p=0.000$), and were more likely to eat fried or fast-food during stress ($p=0.000$). BMI was significantly related to changes in weight, late-at-night eating, avoidance of meals and guilt for eating fatty foods. Fried food intake and stress was significantly related to physical activity. When university students were excluded from the obese group, an unhealthy amount of dietary fat intake was also linked to psychological issues, especially anxiety and stress, especially among youth females. The results also emphasize the importance of nutrition and mental health education that should be offered in universities, no matter students' weight status.

Keyword: Dietary fat; Obesity; Mental health; Eating Habits; Physical Activity

Article History

Received: 19 February 2026; Revised: 26 March 2026; Accepted: 23 June 2026 Online: 28 June 2026; Published: 30 June 2026; DOI <https://doi.org/10.69501/cb2qt939>

1. Introduction

All fats are essential macromolecules which are fundamental for human physiology and energy stores. They also allow fat soluble vitamins (A, D, E and K) to get absorbed and also provide essential fatty acids required for normal growth and metabolic processes (Meijaard et al., 2022). Fats in the diet can be grouped into either saturated fatty acids (SFAs), monounsaturated fatty acids (MUFAs), polyunsaturated fatty acids

(PUFAs), or trans fatty acids (TFAs). As for cardiovascular health, MUFAs are linked to better control of lipids and less central body fat (fat in the middle) in people who consume them. Conversely, the presence of SFAs and TFAs, often found in animal foods, processed foods, and fried food, is correlated with higher fat accumulation in the body and negative cardiometabolic consequences (Meijaard et al., 2022; Nykiel et al., 2025).

Obesity has become a great public health problem worldwide (Mallhi et al., 2025). Recently, it has been estimated that over 2 billion adults worldwide are identified as being overweight or obese, and that this is a significant source of morbidity, mortality and disability-adjusted life years (Ng et al., 2025). Consumers' intake of SFAs and TFAs has been shown to be positively associated with BMI and central adiposity measurements, respectively, while having a protective effect on MUFAs and PUFAs, respectively, can be assumed (Mohit et al., 2022) also source from milk (Yousaf et al., 2025; Younas et al., 2024; Khan et al., 2024) and oat rich source have strong antioxidant activity (Manzoor et al., 2023). Besides diet behavior, mental health is now acknowledged as an important contributor to eating behavior and body weight regulation (Ali et al., 2024). Emotional eating patterns, overconsumption of high fat foods and disrupted eating habits have been linked to conditions like stress, anxiety and depression. It is possible these actions can lead to weight gain or metabolic irregularity within the long run.

There is a focus mainly on overweight and/or obese populations, and few studies have addressed overweight, normal weight, and underweight youth, who may already be at risk for poor diet and/or negative psychological factors. This is a serious deficiency especially among the populations of universities in South Asia. The present study was conducted to find the correlation between diet fat consumption, anthropometric parameters and the mental health of university students of Lahore, Pakistan.

2. Materials and Methods

2.1 Study design and setting

A cross-sectional descriptive study was conducted over 4-month period at University of Lahore involving the students of university.

2.2 Sample size and sampling

A sample size of 267 was calculated using the formula

$$n = \frac{Z^2 P(1 - P)}{d^2}$$

with $Z = 1.96$, $P = 0.5$, and $d = 0.06$. A total of 271 participants were recruited using convenience sampling.

2.3 Eligibility criteria

Subjects were selected within the age span of 18–35 years. Patient- with adequate psychiatric disorder diagnose, pregnancy, lactation and chronic diseases were excluded.

2.4 Ethical approval

The study received approval from the Institutional Review Board. Informed consent was secured with written consent forms for all participants.

2.5 Data collection

The data was a self-administered structured questionnaire that measured dietary fat, eating and physical activity patterns, and psychological health factors. BMI was computed by self-reported height and weight and classified based on the WHO criteria.

2.6 Statistical analysis

The data has been analyzed through SPSS v25. Frequencies and percentages were used to determine descriptive statistics. Chi-square tests were used to validate correlation between variables; in both cases the p was considered statistically significant if $p \leq 0.05$.

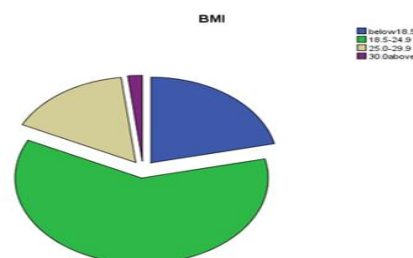


Figure 1. Body Mass Index (BMI) distribution.

3. Results

This section presents the findings of the study on dietary fat intake, obesity, and mental health among adults at the University of Lahore. The results include participants' socio-demographic characteristics, body

mass index (BMI) distribution, and physical activity levels, followed by analyses of the associations between BMI, dietary behaviors, physical activity, and mental health indicators. Chi-square tests were used to determine statistically significant relationships among the study variables, with a p-value ≤ 0.05 considered significant. The findings are presented in tables and figures for clarity and interpretation.

3.1 Sociodemographic Characteristics

Table 1. Socio-demographic characteristics of participants.

Sr no.		Frequency	Percentage
1	Gender		
	Males	62	22.9%
	Females	209	77.1%
2	Age		
	18-25 years	270	99.6%
	26-35 years	1	.4%
3	Weight		
	40-60 kg	172	63.5%
	61-80 kg	85	31.4%
	81-110 kg	14	5.2%
4	Height		
	4'0-5'0	25	9.2%
	5'1-6'0	241	88.9%
	6'1-7'0	5	1.8%

Table 1 presents the demographic characteristics of the 271 participants in terms of gender, age, weight, and height. The sample was predominantly female (n = 209, 77.1%) compared to males (n = 62, 22.9%). Most participants were young

adults aged 18–25 years (n = 270, 99.6%), with only one participant (0.4%) in the 26–35 age group, indicating that the sample largely consisted of university students. In terms of weight, most participants (n = 172, 63.5%) weighed between 40 and 60 kg, followed by 31.4% (n = 85) in the 61–80 kg range and 5.2% (n = 14) in the 81–110 kg range. Regarding height, the majority (n = 241, 88.9%) were between 5'1" and 6'0", while 9.2% (n = 25) were between 4'0" and 5'0", and a small proportion (n = 5, 1.8%) exceeded 6'1".

3.2 BMI Distribution

Table 2 and Figure 1 demonstrated the distribution of BMI of the 271 participants using the classification of the WHO. Most of the participants (60.9%) were in normal BMI range, followed by underweight (21.4%), overweight (15.9%) and obese (1.8%). This means that the majority of participants were not obese and there was a high number of underweight participants.

Table 2. BMI Distribution of participants.

	Frequency	Percent
Below18.5	58	21.4%
18.5-24.9	165	60.9%
25.0-29.9	43	15.9%
30.0above	5	1.8%
Total	271	100.0%

Table 3. Physical activity levels of participants.

	Frequency	Percent
Rarely exercise	106	39.1%
Light activity	85	31.4%
Moderate activity	55	20.3%
Regular exercise	25	9.2%
Total	271	100.0%

Table 4. Association between BMI and weight change.

BMI	Weight change in the past 2 years				Total	p-value
	Increase significantly	Increased slightly	Remained stable	Decreased		
Below18.5	0	17	26	15	58	0.000
18.5-24.9	26	66	61	12	165	
25.0-29.9	10	23	8	2	43	
30.0above	1	2	2	0	5	
Total	37	108	97	29	271	

Table 5. Association between gender and anxiety.

Gender	Feel anxious of worried			Total	p-value
	frequently	sometimes	rarely		
Male	8	34	20	62	0.000
Female	80	94	35	209	
Total	88	128	55	271	

Table 6. Association between physical activity and fried food consumption.

Physical activity	Often eat fried food				Total	p-value
	Daily	3-5 times per week	1-2 times per week	Rarely		
Rarely exercise	29	35	30	12	106	0.006
Light activity	16	33	28	8	85	
Moderate activity	7	11	23	14	55	
Regular exercise	3	5	9	8	25	
Total	55	84	90	42	271	

3.3 Physical Activity

The physical activity levels of the 271 participants are shown in Table 3. Most respondents (39.1%) said they rarely exercise, 31.4% said it was light, 20.3% said it was moderate and 9.2% said it was regular. This means that most participants were not active physically at a great level.

3.4 Associations Between Study Variables

Statistically significant association between BMI and weight change w.r.t. past two years has been found; weight gain is seen to be the highest group for the individuals with normal BMI range (Table 4). BMI was also significantly related to trying to cut down on eating fatty foods in order to lose weight ($p=0.003$), late night eating ($p=0.031$),

consumption of sugar-sweetened beverages ($p=0.029$), skipping meals and consuming fatty food ($p=0.015$), and feeling guilty after eating a fatty food ($p=0.038$).

As shown in table 5, of the 271 people who took part in the study, 62 were male and 209 were female. Of the males, 8 felt often, 34 felt sometimes, and 20 felt rarely anxious or worried. Females: 80 often felt anxious or worried, 94 had feelings of anxiety or worry sometimes and 35 rarely felt anxious or worried. The p-value was 0.000 which means it is a statistically significant association between gender and anxiety frequency.

A total of 271 people participated, of which, the majority rarely (5%) or lightly (13%) exercised, and there was a difference

between the quantity of fried food consumed and how often by each group of people (Table 6). Fried food intake level was significantly associated with physical activity level ($p = 0.006$).

4. Discussion

The present results corroborate the findings of Saintila et al. (2024), who performed a cross-sectional study in relations to dietary stages and excess body weight in 5608 university students of Peru, which revealed ADBW products in high consumption were associated with excess body weight (ORB = 1.14). However, also the gender difference in the perception of diet fat as a cause of obesity found in the present study was similar with their findings on nutritional awareness in university population.

Findings that unhealthy dietary behaviors were commonplace among normal weight and underweight subjects have been reported previously, and with age being an independent risk factor for overweight or obesity as hormones and metabolism change as a function of age (Hussain et al., 2026; Zahra et al., 2026). This highlights the need to look at nutrition interventions for all students, irrespective of BMI status.

The high population difference in the frequency of anxiety was statistically significant ($p=0.000$) for this study as reported by Mohamad et al. (2021) in Malaysian university students where the level of anxiety was measured to be frequent, occasional, and rare, in a similar proportion. In the same way, the gender-stress-eating link observed in the current study is similar to that reported by Du et al. (2022), who observed that emotional eating was a mediating factor between perceived stress and dietary risk, while sleep quality was a moderating factor only in females.

Higher consumption of fried food was significantly associated with levels of physical activity observed in this study ($p=0.006$), similarly to Feraco et al., 2024 who found that low values of physical activity were significantly associated with high intake of large portions of high-fat food

in the Italian population-based survey ($p=0.015$).

4. Conclusion

This study demonstrates that unhealthy dietary fat intake and associated mental health concerns occur not only in obese individuals but also in normal-weight and underweight university students. Stress, anxiety, and guilt were significantly correlated with dietary behaviors, with females showing a particularly strong relationship between stress and unhealthy food choices. The underweight group exhibited patterns suggestive of disordered eating, including meal restriction and guilt, indicating that this group is often overlooked despite being at nutritional and psychological risk. These findings highlight the need for nutrition and mental health education programs that target all university students regardless of weight status.

Credit authorship contribution

statement: Umaima Akhtar, Wania Rafi, Iqra Asghar, Momina Shehzadi, Laiqa Gull, Eshaal Amin: writing original draft, data collection, formal analysis, conceptualization. Tabeen Irfan: supervision, methodology, review & editing.

Declaration Of Competing Interest: The authors would like to declare no competing interests. The authors have no competing financial or personal relationships to disclose that could have appeared to bias the work reported in this paper.

Data Availability: Data will be available upon request.

Acknowledgments

The authors would like to thank Department of Human Nutrition and Food Technology, Faculty of Allied Health Sciences, Superior University Lahore for the permission to carry out this research and also the University of Lahore. Finally, the authors

would like to express their gratitude towards all participants for their willingness to participate in this study.

Reference

- Albrahim, T., Almnaizel, A.T., Alroqaiba, N., et al. (2025). Comparative analysis of dietary fat intake among female university students in Riyadh: a cross-sectional assessment of health sciences versus non-health sciences disciplines. *Food & Nutrition Sciences*, 16, 74–94.
- Ali, Z., Eltayeb, L. B., Fattiny, S. Z., Mallhi, I. Y., Javed, F., Alyousef, A. A., ... & Ahmad, M. (2024). COVID-19 and diet: Efforts towards a balanced diet and sustainable nutrition among university students in Pakistan. *PeerJ*, 12, e16730.
- Azhar, W., Qadhi, A., Abusudah, W., et al. (2026). The effects of Omega-3 supplementation on stress, anxiety, depression, sleep quality, and everyday memory in individuals with psychological distress: A randomized, double-blind, placebo-controlled trial. *Journal of Affective Disorders*, 399, 121055.
- Du, C., Adjepong, M., Zan, M.C., et al. (2022). Gender differences in the relationships between perceived stress, eating behaviors, sleep, dietary risk, and body mass index. *Nutrients*, 14(5), 1045.
- Feraco, A., Armani, A., Amoah, I., et al. (2024). Assessing gender differences in food preferences and physical activity: a population-based survey. *Frontiers in Nutrition*, 11, 1348456.
- Ghaffarian-Ensaf, R., Nadery, M., Khadem, A., et al. (2025). Association between dietary fat quality indices and mental health across age and sex groups: a cross-sectional study. *Nutrition & Food Science*, 55(7), 1185–1201.
- Hussain, Z., Ali, W., Zahra, T., Ali, S., Hussain, A., Wali, A., ... & Mehmood, S. (2026). Obesity and Overweight Prevalence and Its Association with Diet and Physical Activity Among Female Teachers. *Journal of Food and Agricultural Technology Research*, 5(01), 1-11.
- Khan, I. T., Ajmal, M., Ahmad, S., Akram, M. U., & Mohiuddin, M. (2024). Antioxidant Capacity and Oxidative Changes in Lipids of Cow and Buffalo Milk Yoghurt in Different Storage Temperatures. *Journal of Food and Agricultural Technology Research*, 3(02), 93-107.
- Li, Y., Cheng, Y., Zhou, Y., et al. (2022). High fat diet-induced obesity leads to depressive and anxiety-like behaviors in mice via AMPK/mTOR-mediated autophagy. *Experimental Neurology*, 348, 113949.
- Mallhi, I. Y., Umair, M. K., Norani, M. A., Shahzaib, S., Ali, M. U., Hameed, S., ... & Iqbal, M. J. (2025). Nutritional Strategies for Type 2 Diabetes: A Comprehensive Review on Current Evidence and Future Perspectives. *Journal of Food and Agricultural Technology Research*, 4(02), 1-18.
- Manzoor, M. S., Pasha, I., Younas, S., Zhu, M., Hussain, R., Arqam, U., ... & Chughtai, M. F. J. (2023). Phenolic acid profile of oat cultivars, and their suppressive effect on intracellular reactive oxygen species. *International Food Research Journal*, 30(1).
- Meijaard, E., Abrams, J.F., Slavin, J.L., & Sheil, D. (2022). Dietary fats, human nutrition and the environment: balance and sustainability. *Frontiers in Nutrition*, 9, 878644.
- Mohamad, N.E., Sidik, S.M., Akhtari-Zavare, M., & Gani, N.A. (2021). The prevalence risk of anxiety and its associated factors among university students in Malaysia: a national cross-sectional study. *BMC Public Health*, 21(1), 438.
- Mohit, M., Mousavinezhad, H., Karami, E., & Masoumi, S.J. (2022). The effect of different types of dietary fatty acids on body fat: a review. *International Journal of Nutrition Sciences*, 7(3), 125–130.
- Ng, M., Gakidou, E., Lo, J., et al. (2025). Global, regional, and national

- prevalence of adult overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021. *The Lancet*, 405(10481), 813–838.
- Nykiel, S., Misiuk, J., Kopeć, K., et al. (2025). The dietary fats: a comprehensive study about the influence of different types of fats on general health and developing diseases. *Quality in Sport*, 40, 58799.
- Saintila, J., Carranza-Cubas, S.P., Santamaria-Acosta, O.F., et al. (2024). Breakfast consumption, saturated fat intake, and body mass index among medical and non-medical students: A cross-sectional analysis. *Scientific Reports*, 14(1), 12608.
- Saintila, J., Ruiz Mamani, P.G., Ramos-Vera, C., et al. (2024). Intake of foods high in saturated fats, vegetarian dietary pattern, and sociodemographic characteristics associated with body weight in Peruvian university students. *Frontiers in Nutrition*, 11, 1361091.
- Tan, S.L., Jetzke, M., Vergeld, V., & Müller, C. (2020). Independent and combined associations of physical activity, sedentary time, and activity intensities with perceived stress among university students: internet-based cross-sectional study. *JMIR Public Health and Surveillance*, 6(4), e20119.
- Younas, S., Murtaza, M. A., Manzoor, M. S., Arqam, U., Ali, Z., Hafiz, I., ... & Imran, M. (2024). Effect of probiotic incorporation on physicochemical attributes of yogurt during storage and influence on cholesterol assimilation. *Journal of Food Science*, 89(2), 1243-1251.
- Yousaf, M., Shakoar, S., Abbas, S. Q., Asghar, M. T., & Younis, S. (2025). Physicochemical Properties and Organoleptic Assessment of Goat Milk Cheese. *Journal of Food and Agricultural Technology Research*, 4(02), 33-49.
- Zahra, H., Abbas, W., Anam, A., Iqbal, B., & Rasool, S. (2026). Association of Ketogenic Diet Adherence with Body Weight and Adiposity in Overweight and Obese Adults in Islamabad, Pakistan. *Journal of Food and Agricultural Technology Research*, 5(01), 22-36.