



## Research Article

### EFFECT OF LATE-NIGHT EATING ON HEALTH: A SURVEY FROM UNIVERSITY STUDENTS

Hafiza Madiha Jaffar<sup>1,2\*</sup>, Wardah Ahsan<sup>1</sup>, Khunsha Aqeel<sup>1</sup>, Rida Sajjad<sup>1</sup>, Marwa Tariq<sup>1</sup>, Humaira Ahmed<sup>1</sup>, Noor Fatima<sup>1</sup>

<sup>1</sup>University Institute of Diet & Nutritional Sciences, Faculty of Allied Health Sciences, The University of Lahore, Lahore 54000.

<sup>2</sup>Institute of Diet & Nutritional Sciences, Government College University Faisalabad.

\*Corresponding author: [madihajaffar06@gmail.com](mailto:madihajaffar06@gmail.com)

## Abstract

Late night eating is characterized by eating after 10 pm or eating 2 hours before sleep at least 3 times per week, it is also characterized by the number of late-night eating episodes and the proportion of total daily calories consumed during the eating episode. This cross-sectional study aimed to investigate the association between late-night eating habits and various health issues among individuals from multiple universities in Pakistan. Data was collected from over 15 universities, including the University of Lahore, Comsats University, Bahria University, Punjab University, Karachi University, and de Montmorency College of Dentistry. A non-probability convenient sampling technique was employed to select more than 150 participants for data collection. Participants were evaluated using a pre-tested questionnaire. Dietary choices, circadian rhythms, psychological stress, and social influences are just a few of the things that have an impact on late-night eating habits and the health problems that go along with them. The results of the study indicated that a significant proportion of the participants experienced health issues as a result of their late-night eating habits. Among the observed health issues, headache was the most prevalent, affecting 75% of the participants, followed by sleep disorders (66%), depression (63%), and acidity (59%). In contrast, a lower percentage of individuals reported issues such as diarrhea (29%), vomiting (25%), and piles (21%). For late night eating, majority of the participants approximately 95 % were preferring consuming meals, fried foods and confectionary items for late night snacking and the least consumption was observed of corn and popcorn that accounted for 60 % and 57 % respectively. It was concluded that late night eating is associated with many digestive, metabolic and psychological issues that have a negative impact on overall health of an individual. The increase in frequency and size of late-night eating in adolescence and adulthood will lead them towards an unhealthy aging.

**Keywords:** Late-Night eating, Students, Consumption, Factors.

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## 1. INTRODUCTION

Health is a condition of complete mental, social, physical well-being and not just the absence of disease (Larsen, L. T. 2022). Late night eating problem refers to a condition characterized by nocturnal hyperphagia and nocturnal ingestion and is widely accepted as a major cause of premature death from cardiovascular disease, diabetes, and cancers (Ni et al., 2019). It also leads to chances of poor mental function and altered circadian rhythm, ultimately leading to impaired

learning and academic failures (Runfolo et al., 2014). 15% of late-night problems were observed among the university students of Brazil, followed by 9.5% in Turkey, 5.8% in Egypt, 4.2% among the American university students and 1.6% among Chinese college students (Hamdan et al., 2023).

Circadian cycle and late-night eating altogether cause misalignment to metabolic dysregulation in human body as, when a person eats late at night, the body's internal circadian clock arouses sleep pattern and



this is a risk factor for weight gain. The circadian time-keeping system in human changes energy metabolism so that wakefulness, food intake and activity are regulated during the solar day while sleep, fasting and inactivity occurs during the solar night. Being awake during the night causes physiological and behavior disturbances because it arouses a state of desynchrony between the circadian clock and wakefulness sleep cycle known as circadian misalignment (Asher et al., 2015). The time of meal consumption has a big impact on sleep cycles. Healthy sleep patterns could be obstructed by eating more in the late night, just before bed. Any change in circadian rhythm is directly or indirectly associated with wide range of pathologies including metabolism. Circadian rhythms and sleep pattern influence the physiology of organs including digestive system. Also sleep pattern affects autonomic and endocrine system cycles. GI tract has its own circadian rhythm as well, the ingested nutrients are metabolized throughout the day but consuming them during nighttime, in contrast of daytime leads to over-eating and weight gain with potential of metabolic consequences. In light of this, it has been suggested that food consumed at night, prior to sleep, may have adverse effects on health (Vaughn et al., 2014).

When it comes to knowing when to sleep and wake up, the body and mind both have internal clocks. Because the meal signals that it is daytime when you eat at night, the internal clock is disrupted. When a person eats late at night, the muscles that digest and assimilate our food must still work even though they should be resting. This may make it more difficult to get sleepy and prevent from getting the deep sleep which is need to feel rested when wake up (Karatzi et al., 2017).

A lot of factors contribute to late night eating and snacking such as having small insufficient breakfast or skipping breakfast with low levels of physical activity (Karatzi et al., 2017). Late night shiftwork is also a

risk factor and leads to negative health outcomes as individuals who work late night shifts are used to late night meals and disturbed eating patterns (Matheson et al., 2014). Furthermore, disturbed sleeping patterns such as short duration or extensive gaps between sleeping schedules also contribute to consumption of high energy meals late at night (Kjeldsen et al., 2014). Monthly income, mental health, gender, field of study, source or funding etc. have a significant association with late night eating habits among university students (Hamdan et al., 2023).

Women may be more susceptible to these food-related sleep interruptions than men. Late night eating patterns among different age groups, showed that the risk of late-night eating is higher in young population as compared to other age groups (Runfola et al., 2014).

Factors that contribute to late night eating can be reduced by making your habit of taking healthy breakfast daily with enough calories. Students who work in night shifts can replace their unhealthy empty caloric snacks with healthy and nutritious options (Bebet et al., 2018).

Thus, the aim of this study is to assess the impact of late-night eating habits on the health of University students in Pakistan, considering factors such as frequency, food choices, and associated health issues, in order to provide insights into potential risks and implications for overall well-being.

## **2. Materials and Methods**

In this study, a cross-sectional approach was used with a self-structured questionnaire to investigate the relationship between late-night eating habits, diet, health, and weight gain among university students aged 18 to 30 years. Data was collected physically and online from more than 15 different co-educational English medium universities in Pakistan. A total of 150 properly filled questionnaires were used for analysis. The questionnaire included sections on demographic characteristics, anthropometric measurements, eating patterns, modified

food frequency for late-night consumption, common health issues, and weekly dietary recall. The variables analyzed included Body Mass Index (BMI), health, late-night eating, diet, calories, eating pattern, and weight gain. Statistical analysis was performed using SPSS version 25.0, reporting frequencies, percentages, and using chi-square to find associations between variables. A p-value less than 0.05 was considered statistically significant.

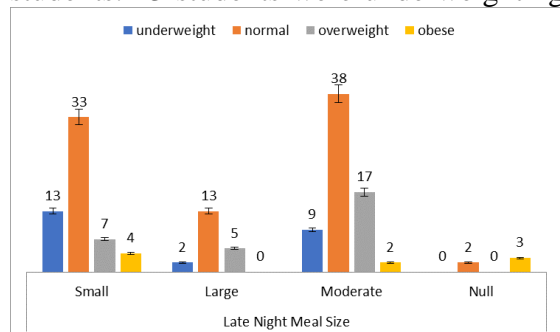
### 3. Results:

Table 1 shows the ratio of male and female that were assessed during the study. The percentages of male and females are 14.7% and 85% with the frequency of 22 and 128. Anthropometric measurements were also included which helped in categorizing individuals into underweight, normal overweight or obese.

**Table1:** Socio-demographic characteristics of the respondents

Category	Frequency (%)
<b>Gender</b>	
Male	22 (14.7)
Female	128 (85)
Age	18-29
<b>BMI</b>	
Underweight (<18.50)	26 (17.3)
Normal Range (15.5-24.99)	86 (57.3)
Overweight (24.99-25.9)	29 (19.3)
Obese (>25.99)	9 (6.0)

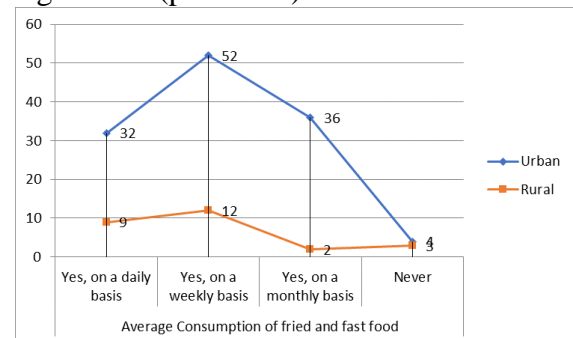
In figure 1 shows the association of late-night meal size on the BMI of the university students. 13 students were underweighting



**Figure 1:** Association between BMI and late-night meal size among university students

and their late-night meal size was small, 13 participants were having large late-night meal size and their BMI was normal, 17 participants were having moderate late-night meal size and were overweight, 3 participants were not having late night meal and they were obese. The association between BMI and late-night meal size among participants was significant ( $p = 0.002$ ).

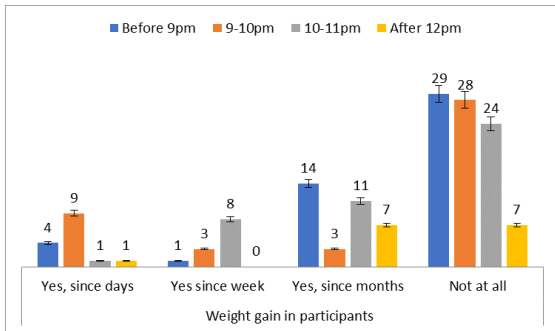
Figure 2 shows that association between residential area and consumption of fried and fast food and state that 52 participants were having fried and fast foods on weekly basis due to their urban residential area, 2 participants were having fried and fast foods on monthly basis due to their rural residential area. The association between residential area and average consumption of fried and fast foods among participants was significant ( $p = 0.052$ ).



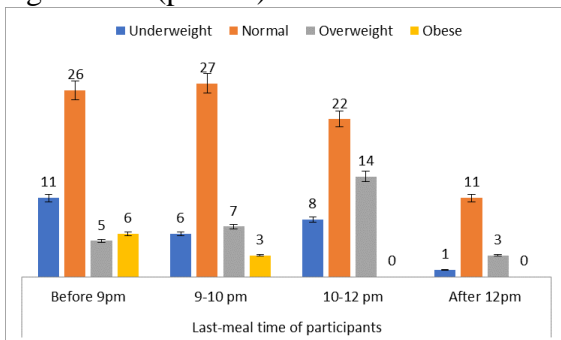
**Figure 2:** Association between residential area and average consumption of fried and fast foods among university students.

Figure 3 shows the association between weight gain among participants and late meal time of university students. 29 participants had not gained weight since months and they were having their meal before 9pm, 11 participants gained weight since months and were having their late-night meal between 10-11pm. The association between weight gain in participants and late meal time was significant. ( $p = 0.001$ ).

Figure 4 shows the association between BMI of participants and last meal time of participants. BMI of 26 participants were normal and their last meal time was before 9pm, 14 participants were overweight



**Figure 3:** Association between weight gain among participants and late meal time of university students whereas their last meal time was in between 10-12pm. The association between last time meal and BMI of participants was significant. ( $p=0.05$ ).



**Figure 4:** Association between BMI of participants and last meal time of participants.

#### 4. Discussion

Food patterns and eating timings affects human physiology. Late night eating can result due to not getting enough calories during the day and this habit of late-night eating can affect physiological health as well as psychological health. Late night eating can lead to obstruction in sleep patterns, disturbs circadian rhythm as well as affect the hormone levels. It gives rise to many diseases such as diabetes, cardiovascular diseases, obesity and many more. Moreover, along with its effect on physical health it also has a strong effect on the mental health of an individual as it can lead to feelings of guilt, stress and depression among the individuals. The current study was conducted to find out the effect of late-night eating and its effect on health among university students. The participants were selected through a non-

probability convenient sampling technique. In the current study the results showed that 15% males and 85% females were in the age group of 18-30 years that ate late at night. across sectional study was conducted which showed that 47% males and 54% females with ages from 18 to 25 years old consumed meals late at night ( Hamdan et al., 2023). In the current research the results showed that out of 150 participants, 17% were underweight having BMI below 18, 57% were having normal BMI of 18-24.9, 19% were overweight having BMI of 25-29.9, while only 6% were obese having BMI above 30. Another study was conducted in which it was reported that 68.4% of the students had normal BMI, 18.9% were overweight and only 4.4% were obese that had late night eating disorders (Hamdan et al., 2023). In the current study, the results showed that out of 150 participants, 63% had severe depression, while 37% of the participants did not have depression that were suffering from late night eating. A similar study conducted observed that about 32.05% having late night eating problem were suffering from depression (Zaidi et al., 2020). The reason of this difference might be regional change as region may affect the causes and number of people suffering from depression. The current study found that out of 150 participants, majority of the participants that were consuming fried and fast food were living in their own houses, 20% of the participants were living in hostels while only 21 % of the participants lived in rented houses. So, a higher consumption of 59% was observed among the participant's living in their own houses while the least consumption was observed among people living in hostels. A cross sectional study was conducted in which it was observed that a higher consumption of fried chicken was observed in participants living in dormitory boarding (Jun et al., 2015). The difference might be due to advancement in food delivery opportunities which are nowadays easily accessible to every citizen. Even people living at homes

are eating fast food by placing orders remotely. In the present study, we found that out of 150 participants, 22 % of the participants had a BMI above 25 kg/m<sup>2</sup> that had a frequency of late-night eating. One of the main adverse effects of late-night eating is weight gain and our results were in accordance of a cross sectional study conducted that observed participants that consumed late night snacks and meals were overweight and obese and had a BMI higher than 25 kg/m<sup>2</sup> (Okada et al., 2019). In the current study, we found that out of 150 participants only 14.7 % of the participants had a complete control over their eating when they woke in the middle of the night, while majority of the participants accounting for 85.3% did not have control over their eating behavior when they woke up in the middle of the night. A similar study conducted by that observed that a greater number of people that were 27.7% of the participants had complete control over their eating habits when they woke in the middle of the night (Batra et al., 2019). In the current study, we found that out of 150 participants, 85% of the participants preferred dairy products at the time of late-night snacking. However, our results differed from a study that stated only 28.4% of the participants preferred dairy products at the time of late-night snacking (Yu, C. K. C., & Lam, T. C. 2017). In the current study, we found that out of 150 participants, 92% of the participants preferred sugary drinks and food at the time of late-night snacking. These results were not similar from a study that was conducted stating that 42.8% were consuming sweet products at the time of late-night snacking (Yu, C. K. C., & Lam, T. C. 2017). The current study found out that out of 150 participants a higher prevalence that is 85% of the females were night eaters as compared to males that were only 14%. Our results differed from a study conducted that stated a higher prevalence was observed in males being late night eaters rather than females (Hernandez et al., 2016). In the current study, the results showed that out of 150

participants majority of the participants that were 56% were suffering from late night eating disorders and had sleep disorders, as stated earlier that late night eating causes sleep disorders, our value was close to a study conducted in which all the participants that were 67.7% with late night eating disorders were suffering from sleep disorders (Hamurcu, P. 2022). In the present study, out of 150 participants, 95% of the participants preferred fried and food high in fat during their snacks at night time. In a similar study conducted, it was observed that a large amount of energy was consumed from fat during late night snacking (Hernandez et al., 2016). Fast food has become a trend among youngsters since several years and this trend of consumption of fried and food high in fat is increasing day by day. In the current study, the results showed that out of 150 participants, 52% females suffered from depression while only 11% of the males suffered from depression due to late night eating problems. A similar study was conducted that stated that a higher prevalence of depression was observed due to late night eating among females than males accounting for 7.2% and 4.9% respectively (Miraj et al., 2022).

### **5. Strengths and limitations**

The strong point of our study is referred as we were engaged to determine the prevalence of late-night eating on the health among university students.

Whereas we also experienced some limitations including, duration of the study was very short, limited data on late-night eating related health effects is available, faced difficulty in collecting data physically due to Ramadan and Eid holidays.

### **6. Conclusion**

Late night eating is more common in early stages of adulthood and is associated with many adverse health conditions like diabetes, obesity and cardiovascular diseases. The majority of people prefer late night eating approximately 1 to 2 times per week and the maximum who gained weight were having their late-night meal between

10 to 11pm. Late night eaters experience a variety of physical, metabolic and psychological health disorders. Foods that are eaten mostly at night are full meals, fried and high fat foods, sugary drinks and foods, fruits and dairy products. Improper sleep pattern, modern lifestyle, residential area and working in night shifts are some of the risk factors that lead people to late night eating and ultimately put their lives at stake.

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