*Original Research Article*

# Weight Change Before and After 30 Days of Intermittent Fasting Among University Students in Pakistan


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**ABSTRACT**

**INTRODUCTION**: Fasting is a practice of abstaining from certain or all kinds of food and beverages depending on the cultural and religious values of the individual. The objective of this study was to observe the effects of intermittent fasting on the weight of Muslim university students in Karachi, Pakistan.

**METHODS**: A longitudinal study was undertaken at the public sector university in Karachi, Sindh, Pakistan from 13 April to 12 May 2021. Using a predefined questionnaire at the beginning and end of one month of intermittent fasting, personal data and weight changes were recorded for a total of 95 participants.

**RESULTS**: The sample was based on primary medical students with a predominance of 73.7% females (70). Most of them (67.4%) were in the age range between 20 and 29 years. About 44 (62.90%) were under the normal BMI of 18.5. When comparing the participants' weight, the mean weight pre-fasting was 58.66±12.12 kg, and the weight after one month of fasting was 58.76±12.67 kg showing a difference of 0.10 kg and a non-significant p-value of 0.73. 17.9% of the subjects had gained over 1 kilogram, 23.2% had lost over 1 kilogram, and 22.1% maintained their weight, after fasting.

**CONCLUSION**: The study indicated a weight change in most individuals enrolled. Although the weight change was not significant, an increase was seen among most of the individuals. Factors such as decreased physical activity due to COVID-19 quarantine practices, consumption of high-calorie dense foods, and reduced metabolism during fasting may contribute to the results.



*Keywords: Diet, Fasting, Intermittent Fasting, Metabolism, Weight Loss, Young Adults*

## INTRODUCTION:

Fasting is achieved by minimal or no consumption of food or beverages ranging from a period of a few hours or multiple weeks [1]. Religious fasting can be observed in Christianity, Buddhism, Jainism, Taoism, and Hinduism [2]. During fasting, an individual is required to abstain from eating for a certain number of hours. If it is performed during a particular time of the day, it is called intermittent fasting. The length of the fast varies depending upon the type of fasting. A religious fast can last up to 18 hours in tropical countries [3-5].

Over recent years intermittent fasting has gained popularity as a diet trend for weight loss and other benefits such as improving sleep, gut microbiome, and metabolism [6]. Intermittent fasting raises the question of how effective it is in losing weight [7]. Many studies have shown fluctuating data on the weight change during the month of Ramadan which is one of the models for intermittent fasting. Previously, a study conducted in a mosque in London comparing the weight before the beginning of the holy month with the weight of participants at the end of the month showed a reduction of less than one kilogram (kg) of weight for 46% of the participants. Also, those who continuously fasted every day throughout the whole month could lose more weight. However, all participants regained their weight one month later [8].

Another study conducted about the differences in the metabolism when fasting in university students concluded that participants had a decrease in glucose and BMI but not a significant difference in cholesterol [9]. Similarly, a study in Jordan monitoring students' lipid and glucose levels after fasting found a weight decrease in males of 2.2 kg and females of 1.2 kgs with the high-density-lipoprotein increase and low-density-lipoprotein decline throughout Ramadan [10]. A non-systematic review tabulated the nutrient intake and weight changes from available studies stating no robust data on weight change [11]. As of now, no study has been conducted in Pakistan assessing the weight change of the youth because of fasting during the coronavirus pandemic.

The aim of this study was to assess and monitor the effects of fasting during the 30 days of intermittent fasting among university students from Karachi, Pakistan.

## METHODOLOGY:

A longitudinal study was undertaken at the public sector university in Karachi, Sindh, Pakistan from 13 April to 12 May 2021. All authors hereby affirm that all procedures followed the ethical guidelines outlined in the 1964 Declaration of Helsinki after being reviewed and approved by the institutional ethics committee (Reference # S212).

The sampling technique used was non-probable and convenient. The sample size was calculated through OpenEpi Version 3. The population size was 1000000, the anticipated frequency was 7.4, and the confidence interval was 95%. The inclusion criteria consisted of participants aged 18 years or older and university-going students who were either normal weight, overweight, or obese. All those who were underweight, who failed to fast for more than 15 days, or who did not fill the post-intermittent fasting questionnaire were excluded from the study. Informed written consent was documented and requested from each patient before their inclusion in the study. All participants were advised to consume 45-65% of their calories from carbohydrates, 10-35% from protein, and 20-35% from fat. They were advised to eat a normal number of calories two days a week and then reduce 20-25% of average calories 5 days a week, and avoid starchy and fried items traditionally consumed in Ramadan such as pakoras, samosas, dahi baray, jalebi, etc.

The data collection procedure was carried out as follows. A predefined proforma was distributed among the students using the inclusion criteria mentioned above. All participants were requested to give informed consent and fill in their socio-demographic information, including age, gender, weight, height, university, comorbidities, and lifestyle. Body mass index was reported by dividing the square of height in meters by weight of the individual in kilograms according to the following categories:

If a patient's BMI was <18.5 $kg/m^2$, he/she was considered underweight. If a patient's BMI was between 18.5 to 24.9, he was considered normal weight. If a patient's BMI was between 25 to 29.9, he was considered overweight. If a patient's BMI was > 30, he was considered obese.

The students who agreed to observe intermittent fasting during the study were guided by the authors about the schedule of intermittent fasting. All individuals were requested to fast from sunrise to sunset. In total 16 hours of fasting was observed by the participants. The participants were requested to maintain a diary where any deviations from the schedule must be observed. If individuals could not keep fasting due to weakness, they were requested to have breakfast immediately and consume food to prevent hypoglycemia. Water, coffee, tea and other non-caloric beverages were allowed during the intermittent fasting.

After 30 days, all individuals were requested to visit the university health center and they were weighed with their shoes off, using a weighing machine. The weight change was recorded and body mass index was documented. Anonymity was assured as the results were analyzed confidentially. Agreement to be a part of this study was mentioned on the questionnaire, and participants were allowed to withdraw at any time by filling out the forms.

All data were collected by the researchers. Further statistical analysis was done through the Statistical Package for the Social Sciences (SPSS) software version 24, observing the correlation between fasting on weight and BMI. Other variables included in the demographics were also inspected for the multifactorial variance seen among the weight of the individuals.

**RESULTS:**

The results discussed below are of only those 95 participants who had completed both questionnaires provided. Most of the participants were students from Dow University of Health Sciences, 69 (72.6%) (Figure 1). The gender distribution was 70 (73.7%) female and 25 (26.3%) male (Table 1). The mean age was 18±3.31, the bulk being between 20 to 29 years. The study consisted of largely unmarried individuals being 85 (89.5%), whereas married individuals were 10 (10.5%). The vast majority of the participants in the study were in the range of a normal BMI between 18.5 - 24.9 %, with females being 44 (62.90%), and males 16 (64.00%) (Table 2).

When comparing the baseline weight of the 95 students with the weight after intermittent fasting, the mean weight difference in kilograms was 0.10 kg and a non-significant value p-value of 0.73. BMI baseline was also compared to the increased BMI after the fasting month yielding a mean difference of 0.06 kg/m2 with a p-value of 0.59, also considered non-significant (Table 3).

The mean weight change was calculated as an average gain of 0.10 ±2.63 kgs (Table 4). 23 (24.2%), gained between 0.5 to 1 kg, 22(23.2%) lost over 1 kg, 21(22.1%) maintained their weight with a marginal gain or decrease of 0 - 0.5 kgs, and 17 (17.9%), gained over 1 kg. The least number of participants, 12 (12.6%), lost over 0.5 - 1 kgs. Only one obese female participant with a BMI of > 30.0 had lost enough weight after the fasting month to be categorized in the lower overweight BMI category of 25.0 - 29.9 after the 30 days had ended (Table 2).

Figure 1: University Distribution

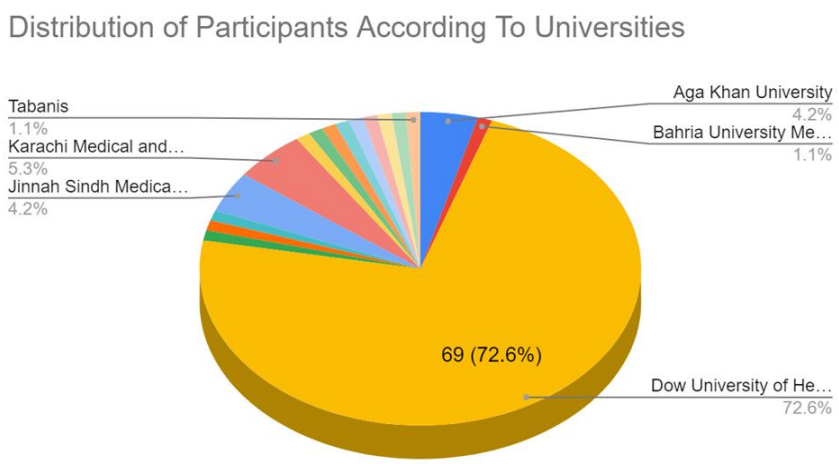


Table 1. Demographics

| **Demographics** | **N (%)** |
|---|---|
| **Gender** | |
| Female | 70 (73.7) |
| Male | 25 (26.3) |
| **Marital Status** | |
| Married | 10 (10.5) |
| Unmarried | 85 (89.5) |
| **Age** | 18±3.31 |
| < 20 yrs | 30 (31.6) |
| 20-29 yrs | 64 (67.4) |
| 30-39 yrs | 1 (1.1) |

Table 2: Chi-square evaluation of gender and age with BMI before and after intermittent fasting.

| | **BMI pre-fasting** | Significance |
|---|---|---|

| | <18.5 Underweight | 18.5- 24.9 Healthy | 25.0- 29.9 Overweight | >30.0 Obese | |
|---|---|---|---|---|---|
| Gender | | | | | 0.118 |
| Female | 17 (24.3%) | 44 (62.9%) | 6 (8.6%) | 3 (4.3%) | |
| Male | 3 (12%) | 16 (64%) | 6 (24%) | 0 (0%) | |
| | **BMI post-fasting** | | | | |
| Gender | | | | | 0.197 |
| Female | 17 (24.3%) | 44 (62.9%) | 7 (10%) | 2 (2.9%) | |
| Male | 3 (12%) | 16 (64%) | 6 (24%) | 0 (0%) | |
| | **BMI pre-fasting** | | | | |
| | <18.5 Underweight | 18.5- 24.9 Healthy | 25.0- 29.9 Overweight | >30.0 Obese | |
| Age | | | | | <0.0001 |
| >20 yrs | 10 (33.3%) | 16 (53.3%) | 3 (10.%) | 1 (3.3%) | |
| 20-29 yrs | 10 (15.6%) | 44 (68.8%) | 9 (14.1%) | 1 (1.6%) | |
| 30-39 yrs | 0 (0%) | 0 (0%) | 0 (0%) | 1 (100%) | |
| | **BMI post-fasting** | | | | |
| Age | | | | | <0.0001 |
| >20 yrs | 10 (33.3%) | 16 (53.3%) | 4 (13.3%) | 0 (0%) | |
| 20-29 yrs | 10 (15.6%) | 44 (68.8%) | 9 (14.1%) | 1 (1.6%) | |
| 30-39 yrs | 0 (0%) | 0 (0%) | 0(0%) | 1 (100%) | |



Table 3: Comparison of Weight Change and BMI Change Before and After Fasting

| **Weight pre-fasting** | **Weight post-fasting** | **Difference** | **P-Value** |
|---|---|---|---|
| 58.66±12.12 | 58.76±12.67 | 0.1 | 0.73 |

| BMI pre-fasting | BMI post-fasting | Difference | P-Value |
|---|---|---|---|
| 21.52±4.043 | 21.58±4.44 | 0.06 | 0.59 |

Table 4: Association of BMI and Gender Before and After intermittent fasting

| | BMI for Male | BMI for Female | p-value |
|---|---|---|---|
| **Pre-intermittent fasting** | 22.47 | 21.18 | 0.17 |
| **Post-intermittent fasting** | 22.62 | 21.2 | 0.16 |

**DISCUSSION**

One of the notable physical changes due to fasting is weight difference among Muslim individuals from Karachi. This study evaluated weight variation and BMI patterns among medical students as gain, loss, or no change. It has been founded that weight was gained among most of them. However, the difference is statistically insignificant, both for weight variable as well as BMI. While there have been factors such as lack of physical activity and changes in mental health etc., that may conflict with the results; the subsequent literature studies support women's weight al. conducted an observational study of 34 volunteers where weight change (p=0.894) and BMI (p=0.764) proved insignificant [12].

Another study done in Turkey investigated metabolic, biochemical, and psychiatric alterations among 39 subjects. It was stated that BMI change was from 64.2±12.2 $kg/m^2$ to 62.8±11.8 $kg/m^2$, which too is seen as insignificant [13]. A meta-analysis of 21 studies by Kul et al. observed no significant changes in women's weight (p =0.620); however, weight reduction was seen as slightly significant in men (p=0.001) [14]. Harder-Lauridsen et al. conducted a nonrandomized, crossover intervention study where a decrease of 1.7 kg of total body mass was seen among ten healthy lean men. This change, too, was seen as insignificant (p=0.05) [15].

There have been recent research papers that state significant differences in weight and BMI among healthy populations. In contrast to our study, Fernando et al. highlighted in their meta-analysis of 70 publications that participants with average weight had a significant decrease of 1.34 kg, which remained after follow-up ($p < 0.001$) [16]. Syam et al. reported that their study involving 43 participants who fasted for 28 days revealed a significant change in baseline weight from 59.82 ± 11.252 to 58.95 ± 11.201 kgs ($p< 0.001$) [17]. Sadeghirad et al. stated in their meta-analysis that weight reduction was seen majorly among 35 studies where African populations had the most significant decrease of an average of 1.13 kg ($P = 0.001$). This study also mentioned that most weight loss was recovered after two weeks as dietary

patterns and energy utilization resumed before intermittent fasting [18]. Compared to the contrasting studies done in recent years, our study was carried out during the onset of COVID-19 when quarantine was strictly practiced. Lack of physical activity, energy expenditure, altered mental status, limited food choices, etc., may be significant reasons for the difference in findings. Studies have also reported that weight reduction is seen more in men than among women. In most Middle Eastern and South Asian countries, females have comparatively lower metabolic rates and physical activity [19].

Further research investigation on the commonly practiced Intermittent fasting by young adults and its effects on body weight and health is recommended. Nocturnal activity is high during fasting and is now increasingly practiced. This may cause changes in body metabolism. A study states that sleep quality significantly improved after fasting due to resumed dietary patterns [20]. The participants in this study had no severe comorbidities, and their food choices were primarily high in carbohydrates and fat. This can be an alerting topic to discuss if consuming lipid-rich food after hours of fasting may lead to cardiovascular diseases, hypertension, and obesity. Abstaining from calorie-rich diets has improved blood lipid profile, so this can hypothetically prove that diet has a significant effect on improving or worsening health during fasting [21].

The study aims to establish the linkage between intermittent fasting and weight loss. It particularly observes the effect of fasting without the consumption of beverages including water and its effects on the weight of young individuals. It also provides insight into the consequences of intermittent fasting with the consumption of high-calorie foods and fasting during the day with minimum physical activity. Therefore, it reinforces the need for adherence to a healthy diet alongside exercise with intermittent fasting to progressively lose weight.

The limitations of the study are acknowledged. Only students were included in the study from which a small minority was overweight. Also, the study was in Karachi, Pakistan, and no participants from different ethnicities and geographical locations were present. The research was conducted during the COVID-19 pandemic and may not represent normal circumstances of individuals due to quarantine practices. Lastly, data collection was through self-filled questionnaires, which could lead to the risk of bias.

**CONCLUSION:**

The study aimed to observe the weight changes caused by intermittent fasting. After comparing the participants' weight after intermittent fasting from their baseline weight, most had gained weight, although the results were not statistically significant. The study sheds light on standard intermittent fasting methods used for

weight loss and the impact of fasting without food and water for long intervals on the weight of individuals. It also implies the need for future research to be conducted on intermittent fasting, focusing more on obese individuals and including participants from all ages, professional backgrounds, and diverse ethnicities.

**Ethical Approval:**

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

**Consent**

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).



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