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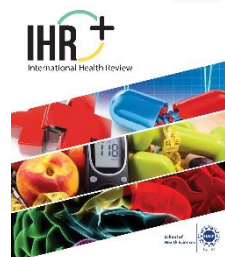
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Title: Habitual Breakfast-Skipping as Predictor of Health Quality among Young Women

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Habitual Breakfast-Skipping as Predictor of Health Quality among Young Women

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ABSTRACT

Breakfast-skipping habit is quite common among women, especially adolescent girls. Resultantly, their mental health, physical activity level, and menstruation cycle get affected. A quantitative study was conducted to determine this phenomenon. The objective of this study was to determine the effect of breakfast-skipping habits on mental health, physical activity level, and menstruation cycle among women of ages ranging between 18-24 years. A sample of 93 women was selected from different colleges in Lahore. Their demographics, breakfast-skipping habits, mental health, physical activity level, and menstruation cycle irregularities were determined through different tools. The results showed that there was a significant relationship between breakfast-skipping habits, mental health, physical activity level as well as menstrual irregularities. Breakfast-skipping habits predicted the menstrual irregularities significantly ($P=0.02^*$). It was inferred that school and college girls who skip their breakfast daily, suffer from poor mental health and menstrual problems. They were also less active and participated in fewer physical activities. The current study may be further implicated among adolescent girls to have a good breakfast for improved mental health, physical activity level, and menstrual irregularities.

Keywords: breakfast-skipping, mental health, menstruation, physical activity level

1. INTRODUCTION

Breakfast may be defined as the first meal of the day which is taken early in the morning. It is usually consumed before starting the daily activities, within two hours of waking up, no later than 10:00 a.m. Breakfast fulfils almost 20% to 35% of total daily energy needs [1]. Breakfast-

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skipping can be explained as not taking a morning meal. Very few people consume breakfast daily and almost 30% of individuals in the West skip this major meal of the day [2, 3]. Breakfast-skipping is quite common among adults and adolescents [4]. Skipping one's breakfast leads towards a declined health. Moreover, all major food groups are not consumed as breakfast during children's growth which may affect their health adversely. Breakfast, without proper nutritious food items, results in dietary deficiencies which cannot be fulfilled through any other meal in the whole day [5].

Mental health can be defined as functioning of an individual's psychological state at a satisfactory level of behavioral and emotional adjustment. It includes subjective well-being, autonomy, perceived self-efficacy, intergenerational dependence, competence, and self-actualization of one's emotional and intellectual potential among others [6, 7]. It is evident that social and physical functioning and health outcomes are greatly linked with mental health nowadays [8]. Skipping breakfast is rather common among adolescents [9]. In older adults, mental health and breakfast consumption show a positive relationship with each other. Adolescents need to consume breakfast as the ratio of brain as compared to liver is larger in adults since liver cannot store enough nutrients [10]. Taking breakfast with suboptimal nutrient levels adversely affects brain functioning in disciplines, such as behavior, attention, memory, and mood in different population groups, showing poor mental health in adolescents [11, 12]. In adolescence, mental health and nutrition play an essential role. This is because during this period, the development of social abilities and behavioral patterns takes place and almost half of the psychological problems start from the age of 14 years [13].

"In 24 hours day duration an individual's total energy expenditure, divided by his basal metabolic rate can be defined as physical activity level". Individuals are considered as non-pregnant and non-lactating". It is a person's activity that he performs in a day.

Physical activity level= Total energy expenditure/ Basal metabolic rate [14]

The energy requirement of every person depends on their physical activity. Initially, there was a mean value for physical activity level, however, later on, the World Health Organization (WHO) classified it into three categories and associated it with the lifestyle of the population [15].

The three different lifestyle categories, that is, sedentary active lifestyle (no exercise and office work only), moderately active lifestyle (heavy work, housekeeping), and vigorously active lifestyle (two hours swimming and jogging) were based on activity level as 1.40-1.69, 1.70-1.99, and 2.00-2.40, respectively [16, 17]. Many studies have indicated that skipping breakfast is a risk factor for weight gain and obesity [18]. Consumption of breakfast is inversely associated with the basal metabolic index. Studies have investigated that there is an inverse relationship between body mass index and consumption of breakfast, since skipping breakfast leads to obesity and weight gain due to less physical activity [19, 20].

Menstruation cycle can be defined as the periodical discharging of blood, cellular waste, and mucus from the uterine mucosa in women after they reach their adolescent age. The hypothalamus, pituitary gland, and ovaries are involved in this repetitive mechanism of menstruation [21, 22]. There are three phases of menstruation cycle. The first phase is the follicular phase in which there is a development of new follicles. Second phase involves the period of ovulation in which oocytes are produced in the peritoneal cavity and the third phase is luteal in which progesterone is produced through the corpus luteum [23]. The age range between 9.1-17.7 years is the normal age range of menarche with a median of 12.8 years in the United States [24]. The menstrual cycle is 28 days as mentioned in many books of reproductive medicine, however, most cycle range falls between 28-30 years [25]. It is an important issue to evaluate the present situation of breakfast-skipping habits and their effect on the reproductive system of young women [26, 27].

Breakfast-skipping in adolescents is linked with the development of various conditions, behaviors, and unhealthy lifestyle issues, such as mental health, sedentary lifestyle, and menstruation in adolescent girls [27]. The main factors in breakfast-skipping include late rising and shortage of time, less motivation in preparation, and physical inactiveness [28], desire for weight reduction, reduced appetite [29, 30], menstruation [31], tiredness, fatigue, and poor mental health [32].

Breakfast-skipping habit is becoming very common among college girls. Therefore, there is a need to investigate the actual causes of this phenomenon. The poor mental health of college girls is due to skipping their breakfast which results in poor cognition and academic grades. Nowadays, college going girls are more prone to a sedentary lifestyle. Hence, the current study investigated the association between activity level and

breakfast-skipping habit among them. Among many reasons behind irregular menstrual cycle, breakfast-skipping is one of the threatening factors. It is also a known fact that low glucose level decreases the estrogen level which causes irregular menstruation. It can be said that poor mental health, a sedentary lifestyle, and an irregular menstruation cycle are the consequences of skipping breakfast. The current study is likely to educate college girls pertaining to the benefits of consuming nutritious breakfast and preventing them from the hazards of skipping it.

1.1. Proposed Conceptual Model

The proposed conceptual model is presented in Figure 1.

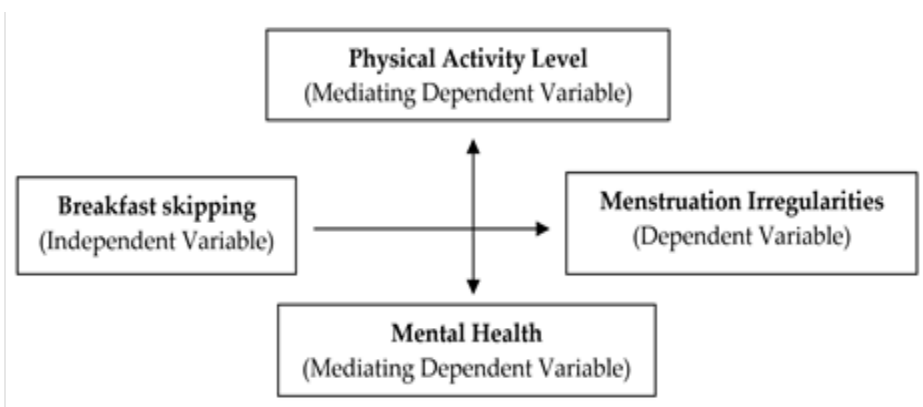


Figure 1. Model: Breakfast-Skipping Habit affecting Mental Health, Physical Activity Level, and Menstruation

2. MATERIALS AND METHOD

The current study investigated mental health, physical activity level, and menstruation as a predictor of diet quality among habitual breakfast skippers. The sample was dependent on certain characteristics of respondents, therefore non-probability purposive sampling technique was employed in the selection of the sample. These characteristics were based on respondents' age, gender, selection from girl's college, and availability of researchers. The sample comprised 93 girls with an age ranging between 18-24 years who belonged to different government colleges of Lahore. These colleges were only specified for girls. All the girls were selected from middle socioeconomic status. Moreover, all of them were physically fit and normal. All the participants with good Urdu and English language were selected.

2.1. Assessment Measures

The following assessment measures were employed in the current research.

2.1.1 Indigenous Demographic Information Sheet. An indigenous demographic information sheet was developed. It comprised details related to name, age, gender, height, weight, education, occupation, marital status, and religion. Moreover, it also covered information related to family income, number of dependents on income, family size, family type, father occupation, father age, father education, mother occupation, mother age, mother education, number of siblings, number of unmarried siblings, birth order, hobbies, distance from college, and health status.

2.1.2. Breakfast Skipping Habits Rating Scale. This rating scale was developed to assess the breakfast-skipping habits among participants. There were four items in this tool, while response categories were six including always, very often, fairly often, sometimes, almost never, and never. Partial modification was conducted during statistical analysis in this rating scale. The rating scale was further divided into four levels, that is, no breakfast, 2 times breakfast, 6 times breakfast, and daily breakfast.

2.1.3. Mental Health Assessment Tool. The mental health assessment tool was developed with the help of definition presented by WHO [6]. The purpose of this tool was to determine the mental health of college girls due to their breakfast-skipping habits. In this tool, five sections were developed, namely 1. anxiety and stress, 2. thinking, creativity, and positivity, 3. socialization, 4. understanding and confusion, and 5. academic progress. In this tool, there was a total of 26 items. There were six response categories including always, very often, fairly often, sometimes, almost never, and never. Cronbach's Alpha reliability of this tool was measured through a pilot study with 10 participants which was calculated to be almost 0.4. However, it was further increased to 0.74 as the sample size increased.

2.1.4. Physical Activity Level Assessment Tool. This tool was developed with the help and modification of the international physical activity questionnaire developed by Craig et al. [33]. The purpose of this tool was to determine the physical activity level of participants due to their breakfast-skipping habits. There were four sections in this tool including 1. physical activities during traveling, 2. physical activities at home, 3. physical activities during playing, sports, and leisure times, and 4. physical

activities while sitting at home and college including studying time total having 18 items. Response categories were six including always, very often, fairly often, sometimes, almost never, and never. Cronbach's Alpha reliability of this tool was measured through a pilot study with 10 participants which was 0.76.

2.1.5. Menstruation Cycle Assessment Tool. The menstruation cycle assessment tool was developed with the help of variables discussed in a study [33]. The purpose of this tool was to determine the regularities and irregularities of the menstrual cycle among college girls due to their breakfast-skipping habits. The tool was divided into five sections including 1. irregular menstruation, 2. frequency of menstrual periods, 3. dysmenorrhea 4. premenstrual syndrome, and 5. abnormal amount of blood loss. There was a total of 15 items and response categories were six including always, very often, fairly often, sometimes, almost never, and never. Cronbach's Alpha reliability of this tool was measured through a pilot study with 10 participants, and it was 0.79.

2.2. Procedure

Permission was sought from the heads of institutes for data collection. Data was collected by providing an assessment questionnaire to participants. Some introduction related to the current research was provided to participants before providing them assessment tool. In the first step, participants were advised to read the questionnaire carefully and then fill in each tool one by one. They were advised to fill out their questionnaire without any help except from the researcher.

Indigenous demographic sheet, breakfast eating habit rating scale, mental health assessment tool, physical activity level assessment tool, and menstruation cycle assessment tool were used as instruments/tools. Firstly, a demographic sheet was given to the participants. Afterwards, the breakfast eating habit rating scale, mental health assessment tool, physical activity level assessment tool, and then the menstruation cycle assessment tool were administered to them, respectively. The average time consumed to fill all assessment tools was 20 to 25 minutes, while the response rate was 99%.

2.3. Statistical Analysis

Data was analyzed with the help of SPSS and Microsoft Word. Firstly, data was entered in SPSS where all the test statistics were applied. Correlation was used to assess the association of demographics, and

independent and dependent variables. Whereas, a multiple linear regression model was used to predict the effect of the independent variable on dependent variables. Descriptive frequencies and mean and standard deviation were also evaluated for the demographics. All the results were presented in the form of tables. The interpretation of results was depicted in Microsoft Word.

3. RESULTS

Descriptive characteristics were used to explain the demographics of sample. Mean and standard deviation were measured for continuous demographics, while frequency and percentage were calculated for categorical demographics. These are given in Table 1 below.

Table 1. Descriptive Characteristics of Study Sample (n=94)

Demographics	<i>M(SD)</i>	<i>f(%)</i>
Age of participants	18.99(1.64)	
Gender of participants		
Female		94(100%)
Height of participant	5.75(5.04)	
Weight of participant	51.19(12.46)	
Education of participant		
FA (Intermediate)		47(50%)
BA (Graduation)		28(29.80%)
MA (Masters)		19(20.20%)
Occupation of student		
Student		78(83%)
Working		3(3.20%)
Both		13(13.80%)
Marital status of the participant		
Single		87(92.60%)
Married		1(1.10%)
Committed		6(6.40%)
Religion of participant		
Islam		94(100%)
Family income		
20,000-30,000		1(1.10%)
31,000-40,000		69(73.40%)

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Demographics	<i>M(SD)</i>	<i>f(%)</i>
More than 40,000		24(25.50%)
No. of dependents on income	6.23(2.45)	
Family size	6.89(2.30)	
Family type		
Nuclear		64(68.10%)
Joint		30(31.90%)
Father occupation		
Private		69(73.40%)
Government		18(19.1%)
Other		7(7.40%)
Father age	50.18(7.31)	
Father education		
Educated		71(75.50%)
Uneducated		23(24.50%)
Mother occupation		
Private		6(6.40%)
Government		3(3.20%)
Other (housewife)		85(90.40%)
Mother age	44.39(7.00)	
Mother education		
Educated		62(66%)
Uneducated		32(34%)
No. of siblings	4.47(1.88)	
No. of unmarried siblings	3.78(1.59)	
Birth order	2.52(1.75)	
Distance of home from college and university		
Near		30(31.90%)
Far		64(68.10%)
Health status		
Healthy		85(90.40%)
Unhealthy		8(8.50%)
Frequency of being sick in precious one year	2.22(2.10)	
Physical or psychiatric disease		
No		82(87.20%)
Yes		12(12.80%)

Table above shows that the mean age of participants was 18.99 years, while all participants were females. The mean height and weight of participants were 5.75 feet and 51.19 kilograms, respectively. Approximately, 50%, 29.80%, and 20.20% of the participants were students of FA, BA, and MA, respectively. About 83% of participants were students, 3.20% were working and not attending college, while 13.80 % were both students and working as well. Around 92.60% of girls were unmarried, 1.10% were married, and 6.40% girls were committed. The religion of all participants was Islam. More or less, 1.10% of girls had a family income of 20,000-30,000 thousand rupees, while 73.40% and 25.50% of girls had a family income of 31,000-40,000 and more, respectively. The mean for the number of dependents based on the income of participants was 6.23, while the mean family size was 6.89 in the current study. About 68.10% of participants belonged to the nuclear family system, while 31.90% belonged to joint family system.

Majority of father participants were privately employed, that is, 73.40%. Whereas, the mean father age was 50.18 years. Approximately, 75.50% of fathers were educated, while 24.50% were uneducated. Majority of mother participants were housewives, that is, 90.40%, while the mean age of mothers was 44.39 years, respectively. Roughly, 66% of mothers were educated, while 34% of them were uneducated. The mean number of siblings, number of unmarried siblings, and birth order of participants were 4.47, 3.78, and 2.52, respectively. The colleges of 31.90% of girls were located nearby their homes, while for 68.10% of girls, distance was quite much. About 90.40% of girls were healthy, while 8.50% were unhealthy. The mean frequency of sickness in previous one year was 2.22 times, while 87.20% of girls did not have any physical or psychiatric disease.

The hobbies of the study sample were also demographics, and these were treated as categorical demographics. Frequency and percentage were calculated for hobbies of the study sample and these are given in Table 2 below.

Table 2. Descriptive Characteristics for Hobbies of Study Sample (n=94)

Demographics	<i>f</i> (%)
Hobbies	
Arts	3(3.20%)
Cooking	2(2.10%)

Demographics	<i>f</i> (%)
Domestic work	1(1.10%)
Dramas	1(1.10%)
Drawing	2(2.10%)
Eating	2(2.10%)
Facebook	1(1.10%)
Gardening	6(6.40%)
Gossips	1(1.10%)
Internet	2(2.10%)
Movies	1(1.10%)
Music	1(1.10%)
Playing	1(1.10%)
Poetry	1(1.10%)
Reading	48(51.10%)
Singing	1(1.10%)
Sleeping	2(2.10%)
Sports	1(1.10%)
Study	13(13.80%)
Traveling	1(1.10%)
Television watching	1(1.10%)
Writing	2(2.10%)

Table above indicated that the hobby of majority of girls was book reading and 51.10% of them had the habit of book reading.

There were four measuring tools. Potential and actual score (maximum and minimum) for each tool, number of items of the tool, Cronbach’s Alpha reliability, and mean and standard deviation for all four tools were measured and explained in Table 3.

Table 3. Descriptive and Cronbach’s Alpha Reliability of Measures (n=94)

Sr#	Measures	Potential (Max)	Potential (Min)	Actual (Max)	Actual (Min)	k	α	M	SD
1	Breakfast skipping habit rating scale	24	4	24	13	5	0.75	20.48	2.44
2	Mental health assessment tool	156	26	142	59	27	0.74	97.43	16.98

Sr#	Measures	Potential (Max)	Potential (Min)	Actual (Max)	Actual (Min)	k	α	M	SD
3	Physical activity level assessment tool	108	18	94	51	19	0.69	72.48	8.99
4	Menstruation cycle assessment tool	90	15	79	23	16	0.73	52.11	12.10

Table above indicates that all measuring tools have a Cronbach’s Alpha reliability greater than 0.60. Potential maximum and minimum scores for breakfast skipping habit rating scale were 24 and 4, while the actual score gained by participants was 24 and 13, respectively. The potential maximum and minimum score for the mental health assessment tool was 156 and 26, while the actual score gained by participants was 142 and 59, respectively. Potential maximum and minimum scores for the physical activity level assessment tool were 108 and 18, while the actual score gained by participants was 94 and 51, respectively. Potential maximum and minimum scores for the menstruation cycle assessment tool were 90 and 15, while the actual score gained by participants was 79 and 23, respectively.

To analyze the association among demographics, independent variable (breakfast skipping habit), dependent variable (menstrual irregularities), and mediating variables (mental health and physical activity level); Pearson correlation was used (Table 4).

Table 4 indicates that there is a significant relationship between breakfast-skipping habits and mental health, physical activity level as well as menstrual irregularities. However, a significant relationship also exists between mental health and physical activity level. Mental health and menstrual irregularities as well as physical activity level and menstrual irregularities are also significantly related. A significant relationship between age and weight, physical activity level and weight, menstrual irregularities and weight, depends on income and family size, number of siblings and depends on income, frequency of sickness in previous year, and depends on income, number of siblings and family size, birth order and family size, birth order and mother age, as well as birth order and number of siblings, was present. A negative significant correlation was also present between family size and weight, physical activity level, and number of siblings as well as mental health and birth order.

Table 4. Pearson Correlation among Demographics, Independent, and Dependent Variables (n=94)

	Age	Weight	Dependents on income	Family size	Mother age	No. of siblings	Birth order	Frequency of being sick in previous one year	Mental health	Physical activity level	Menstrual irregularities
Age		0.26*	0.08	0.03	0.07	0.11	-0.02	-0.11	-0.17	-0.14	-0.08
Weight			-0.03	-0.29**	-0.06	-0.12	-0.05	-0.12	0.19	0.34**	0.33**
Dependents on income				0.42*	-0.03	0.50**	0.16	0.23*	0.16	-0.01	-0.02
Family size					-0.05	0.56**	0.31**	0.14	0.05	-0.18	-0.18
Mother age						0.15	0.28**	-0.60	-0.16	-0.02	-0.11
No. of siblings							0.65**	0.53	-0.73	-0.24*	-0.13
Birth order								0.13	-0.21*	-0.15	-0.10
Frequency of being sick in the previous year									-0.04	-0.11	-0.01
No breakfast	0.01	0.15	0.13	0.08	0.07	0.19	0.21*	0.09*	0.25*	0.20*	0.25*
2 times breakfast	-0.13	0.14	0.02	-0.14	0.07	0.04	0.09	-0.02	0.22*	0.17	0.10
6 times breakfast	0.26*	-0.13	0.21*	0.20	0.13	0.30**	0.07	-0.05	0.10	0.03	-0.04
Daily breakfast	0.02	-0.16	0.06	0.17	0.14	0.15	0.08	-0.15	-0.02	0.03	-0.15
Mental health										0.50**	0.53**
Physical activity level											0.59**
Menstrual irregularities											

To analyze the prediction of the independent variable (breakfast-skipping habit) on the dependent variable (menstrual irregularities) and mediating variables (mental health and physical activity level), a multiple linear regression model was used (Table 5).

Table 5. Multiple Linear Regression Model among Independent and Dependent Variables

	Mental health		Physical activity level		Menstrual irregularities	
	B	<i>p</i>	B	<i>p</i>	B	<i>p</i>
Breakfast skipping habits						
No breakfast	3.53	0.11	1.91	0.11	3.82	0.02*
2 times breakfast	3.77	0.08	1.31	0.26	1.06	0.49
6 times breakfast	1.73	0.50	-0.55	0.69	-0.80	0.66
Daily breakfast	-2.81	0.22	-0.19	0.88	-2.50	0.12
R square	0.10		0.06		0.11	
F-value	2.42		1.37		2.64	

4. DISCUSSION

In the current study, since the R² value for mental health was 0.10, therefore 10% variance in mental health was predicted by the breakfast-skipping habit. Findings revealed that mental health was not significantly associated with breakfast-skipping habits. However, better academic results in examination and IQ levels were linked and associated with breakfast-skipping habits. However, previous researchers conducted a study to evaluate the effect of a good healthy breakfast and mental health of adolescents. In this cross-sectional study, 836 adolescents aged between 13 to 15 years were selected and were accessed through food diaries and child behavior checklists. Results showed that there was a close interaction between mental health and lifestyle factors including breakfast quality [34]. A quantitative study was conducted among 7343 students in Norway. The study evaluated that among 10th-grade students, it was common to skip breakfast, and adolescents who consumed breakfast in routine were significantly less likely to be mentally distressed and scored better in their schools [35]. Different studies concluded that cognitive functions related to test grades, memory, and school attendance were improved through consuming breakfast [30, 36]. In a quantitative systematic study, it was observed that breakfast is necessary for cognition and also showed a good positive effect on the academic activities of children [37].

In the current study, since the R^2 value was 0.06, therefore 6% variance in physical activity level was predicted by breakfast-skipping habits. Findings revealed that physical activity level is not a significant predictor of breakfast skipping habits, however, Pearson Correlation among demographics, independent, and dependent variables showed that there is some association between breakfast-skipping habits and physical activity level. A study reported the association between breakfast, body mass index, and activity level. The study reported that breakfast consumption resulted in lower body mass index levels among individuals [38]. The mechanism of this lower body mass index and consumption of breakfast was explained in another study [39]. Researchers reported that there was a greater tendency to eat more energy-dense food items, such as snacks during lunchtime, among those who did not consume breakfast in the morning, and ultimately resulted in a higher body mass index. Two previous quantitative studies concluded that individuals who skipped breakfast were less active and exercised less and showed a lower level of physical activity [40, 41]. A group of investigators conducted a study and determined that breakfast eaters were more active and exercised more [42]. In another study, it was evaluated that the participants of the research did more exercise on days when they had consumed breakfast; for longer duration and had greater energy expenditures; when calculated by accelerometers [43].

In the current study, since the R^2 value was 0.11, % therefore 11% variance was predicted in menstrual irregularities by the breakfast-skipping habit. Findings revealed that menstrual irregularities are a significant predictor of breakfast-skipping habits. In some previous studies, a survey was conducted to evaluate the relationship between menstrual problems and eating habits in young women. Irregular menses were observed in women who were skipping breakfast. It was concluded that breakfast-skipping causes problems related to the menstruation cycle [44]. The adverse effects of breakfast-skipping on the function of the reproductive system have gained considerable attention. A survey was conducted to examine this problem by using a questionnaire among college students. It was revealed that dysmenorrhea was too common in individuals who were skipping their breakfast through five annual surveys of questionnaires. College students, who were heading towards the maturation of the post-adolescent period, were suffering from menstrual disorders as well as poor physical conditions due to their breakfast-skipping habits [31].

4.1. Conclusion

The current study concluded that breakfast-skipping habit is quite common among teenagers and this habit may lead towards an unhealthy lifestyle. Poor mental health, a sedentary lifestyle, and menstrual irregularities are common problems among students who skip their breakfast daily. It is important to wake up early in the morning to have breakfast daily and eat healthy food before the start of any activity.

CONFLICT OF INTEREST

The author of the manuscript has no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

DATA AVAILABILITY STATEMENT

The data associated with this study will be provided by the corresponding author upon request.

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