

Investigating the Relationship between Internet Addiction and Dietary Behavior among Students: an analytical cross-sectional study

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ABSTRACT

Background: Internet addiction can affect students' general health. Regarding to the importance of healthy eating and the impact on health and academic achievement of students. This research was conducted to aim the assessment of relationship between internet addiction and dietary behavior among students.

Methods: In this an analytical cross-sectional study, 373 nursing and midwifery students of Tehran University of Medical Sciences participated in 2020. Data were collected by Young's Internet Addiction Scale, demographic data and Dietary Behavior questionnaire. Data analyzed by SPSS V.21 and descriptive indicators including frequency, percentage, and inferential tests including chi-square test. A significance level of less than 0.05 was considered.

Results: The majority of the student population had no internet addiction by 91.4%. Also, 8.3% and 0.3% from student population were potential risk and high risk respectively. There was a statistical significant correlation between levels of internet addiction and dietary behavior in high-fat diets ($r = 0.483$, $P = 0.004$), snacking ($r = 0.455$, $P < 0.001$), emotional eating behavior ($r = 0.543$, $P < 0.001$) and poor dietary pattern ($r = 0.632$; $P < 0.001$).

Conclusions: It is suggested to improve students' beneficial use of the internet with training and improve their dietary behavior.

Keywords: Addiction, Nursing, Midwifery, Students, Dietary, Addictive behavior

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Introduction

The internet is an important tool for social relationships, information and entertainment, and one of the most accessible media in the world because it has a lot of activities and programs that users can participate in and connect with others around the world. Thus, adolescents and young people are one of these commercial market main objectives (1). Among Internet users in Iran 98% is estimated between the ages of 20 to 30 (2). Internet activities and technologies are rapidly advancing and are attractive for young people (3). Studies have shown that 71.4% of the United States people use the internet (4). Despite of the fact that new communication tools have a positive impact such as up to date data access, scientific literature dissemination, communication between researchers etc., but also have a detrimental impact. The prevalence of internet addiction (IA) has been reported 1.5% to 25% in different countries (5). The prevalence of Internet addiction has been reported 9.5% to 10% in Iran (6) in the Mazloomi Mahmoudabad et al study, prevalence of Internet addiction has been reported 49% among university of medical science. However, different populations were studied and the findings are not comparable directly (7).

Internet addiction disorder is described as overuse of the internet that interferes with daily life and can impair daily function and cause tension when the internet is not accessible. Internet addiction is classified as a mental disorder in DSM-5 (8). Overuse of the internet among users has been accompanied with problems. For example, in a study, prevalence of depression was higher among users who were internet addicted (9). Some studies also showed that Internet addiction has negative and inverse impacts on lifestyle agents such as causing irregular food habits, spending long periods of time in the Internet, lacking physical activity and reducing sleep time (10-12). Kargar et al, 2013 mentioned the importance of hormonal, physical, emotional and behavioral changes in adolescent with increase in eating fast food and carbonated drink, as well as decrease of activity due to long hours of watching

television, playing computer games, may lead to the risk of diseases in adulthood (13).

University students are one of the vulnerable groups in Internet addiction. The internet is a reliable source for finding personal and professional information needs for university students. Students are groups that have largely unfettered, unsupervised access to the Internet and independent control of their time. It has been estimated that problematic usage in college students varies from 1% to 26% in the US and from 6% to 19% internationally (14).

Several studies conducted on students indicate that the internet use rate among students is increasing. Adolescents and students, particularly those in the age range of 15 to 24, are mostly under health-risk behaviors such as smoking, drinking, and adopting poor dietary behaviors. These behaviors lead to multiple adverse health outcomes among them (15). Results of Kim et al study showed that in the addicted users, irregular dietary behaviors due to loss of appetite, high rate of skipping meals, and nutritional imbalances were reported and nutrition quality among them was worse than those who were at risk of internet addiction or no risk internet addiction (16). Another study mentioned that eating disorders can be the reason for many chronic diseases. The study using a food frequency questionnaire determined that among the participants of African American women 0.22 to 0.47 were micronutrient and 0.33 to 0.58 were macronutrient intakes and showed the relationship to eating behavior (17).

The students are known as a vulnerable group due to technology integration in their education. They often easily have access to the internet in universities and the workplace (18). Since the students have professional positions and educational needs, they spend a lot of time on the internet programs. It can affect lifestyle, and dietary behaviors. The information about the dietary behaviors based on the internet addiction levels among university students is limited; therefore, this study aimed to determine

- a) Internet addiction levels
- b) Dietary behaviors
- c) The dietary behaviors based on the internet addiction levels, among nursing and midwifery students.

Methods

This research was an analytical cross-sectional study on internet addiction and dietary behavior among nursing and midwifery students in Tehran University of Medical Sciences in 2020. The sample size by considering the 15% prevalence of internet addiction in Iran (2), significant level of 0.05, and $d = 0.037$ of 400 people was calculated. Finally, out of 400 questionnaires distributed among students, 373 questionnaires were completed and returned.

The sampling method in this study was stratified sampling, taking into account the size of the nursing and midwifery students, the required number of samples were randomly selected from each field of study according to the inclusion criteria.

Inclusion criteria included, being an internet user during the last 6 months with approximately used of once per month. Exclusion criteria included those treated for chronic diseases and nutritional disorders.

Measures

Demographic questionnaire

Demographic questionnaire consisted of age, gender, marital status, field of study, degree of study, study year, parental education, parent's income, employment status, sleep time and disorder, reason of internet use, place of internet use, and status of residence.

Young's Internet Addiction Test (IAT)

Internet addiction was measured using the 20-item IAT questionnaire. The participants were asked to respond to each item using a 5-point scale ranging from 1 till 5, never to always (a total score range 20 to 100). The subjects were defined into three groups: no risk IA (scores: 20 to 49), Potential risk IA (scores: 50 to 79) and high risk IA (scores: 80 to 100). Young's Internet Addiction Scale Data is a standard questionnaire and its validity and reliability has been confirmed in several

studies (10; 18). Persian version of the scale was developed after translations and used in Iran; the reliability with Cronbach's Alpha 0.91 has been approved. Moreover, the validity of the Persian translated version of the scale was sufficient (19). In our study, the number of 20 students completed questionnaires and reliability coefficients with $\alpha = 0.88$ have been confirmed.

The dietary behavior questionnaire

The dietary behavior questionnaire as a self-made questionnaire was designed by researchers and inspired by Kim et al study in Korea (16) and Eating Behavior Patterns Questionnaire (EBPQ), (20). Then validity and reliability were determined. The questionnaire was translated and validated for use in the Iranian students by the Dehghan et al and its validity and reliability were confirmed (20). For validity, 10 professors of the department of nutrition received comments and necessary corrections were applied after review. For reliability, 20 questionnaires were completed by students and Cronbach's alpha coefficient with the 0.90 was confirmed. The Cronach's alpha coefficient for six dimensions of questionnaire of high fat eating (0.93), snacking (0.89), emotional eating (0.91), no planning ahead (0.86), meal skipping (0.88) and poor dietary pattern (0.95) was confirmed. This questionnaire included 44 items. It should be noted that the three questions were common among dimensions. Questionnaire analysis was as follows: the mean score in each dimension with more than 75% shows good nutritional behavior, between 50% to 75%, shows moderate, and fewer than 50% shows weak nutritional behavior. The questionnaires were provided to the students by the researcher and after completion, they were collected again by the researcher at the same time.

Statistical analysis:

Data was analyzed by SPSS 21. Statistical analysis was performed with chi-square test. A significance level of less than 0.05 was considered.

Results

Among the number of 373 participants in the study, 23.60% (88) were male and 76.40% (285) were female. Participant's degree of study included

Bachelor 73.20% (273), master 20.64% (77) and PhD 6.16% (23) with nursing 74.26% (277) and midwifery 21.71% (96) field of study. Most were in the age of 20 to 25 44.51% (166) and were in the second year of study 39.15% (146). The majority of the population reported moderate parent's income 56.84% (211). Most of them

83.91% (313) had no sleep disorder. The result has shown that most of the participants use internet one hour per day 41.83% (156). The reason for internet use was scientific information seeking 42.36% (158) rather than checking email 19.30% (72) and hobby 35.13% (13). Among the study population, 91.4% (341) had no internet addiction, Table 1.

Table 1. The correlation between level of internet addiction and demographic characteristics among students

| | | No risk IA (n=341)91.4% | Potential risk IA (n=31)8.3% | High risk IA (n=1)0.3% | P value |
|----------------------------------------|---------------------------|----------------------------|---------------------------------|---------------------------|------------|
| Gender | Female | 260 (91.2) | 25 (8.8) | 0 (0) | *P = 0.116 |
| | Male | 81 (92) | 6 (6.8) | 1 (1.1) | |
| Marital status | Single | 275 (90.2) | 29 (9.5) | 1 (0.3) | *P = 0.033 |
| | Married | 64 (97) | 2 (3) | 0 (0) | |
| Field of Study | Nursing | 251 (90.6) | 25 (9) | 1 (0.4) | *P = 0.316 |
| | Midwifery | 76 (79.2) | 20 (20.8) | 0 (0) | |
| Degree of Study | Bachelor | 248 (90.8) | 24 (8.8) | 1 (0.4) | *P = 0.489 |
| | Master | 71 (92.2) | 6 (7.8) | 0 (0) | |
| | PhD | 22 (95.7) | 1 (4.3) | 0 (0) | |
| Age | Below 20 | 117 (90) | 12 (9.2) | 1 (0.8) | *P = 0.766 |
| | 20-25 | 151 (91) | 15 (9) | 0 (0) | |
| | 25-30 | 36 (94.7) | 2 (5.3) | 0 (0) | |
| | More than 30 | 1 (50) | 1 (50) | 0 (0) | |
| Study year | First year | 97 (88.2) | 12 (10.9) | 1 (9) | *P = 0.345 |
| | Second year | 137 (93.8) | 9 (6.2) | 0 (0) | |
| | Third year | 75 (90.4) | 8 (9.6) | 0 (0) | |
| | Fourth year | 22 (95.7) | 1 (4.3) | 0 (0) | |
| | More than 4 th | 2 (66.7) | 1 (33.3) | 0 (0) | |
| Parent's income | Weak | 7 (87.5) | 1 (12.5) | 0 (0) | *P = 0.805 |
| | Moderate | 196 (92.5) | 15 (7.1) | 1 (0.5) | |
| | Good | 128 (92.1) | 11 (7.9) | 0 (0) | |
| | Very good | 8 (80) | 2 (20) | 0 (0) | |
| Sleep Disorder | Yes | 48 (80) | 11 (18.3) | 1 (1.7) | *P < 0.001 |
| | No | 293 (93.6) | 20 (6.4) | 0 (0) | |
| The time of internet use (hour/day) | 0 hour | 17 (100) | 0 (0) | 0 (0) | *P < 0.001 |
| | 1 hour | 152 (97.4) | 4 (2.6) | 0 (0) | |
| | 2-4 hours | 132 (89.2) | 16 (10.8) | 0 (0) | |
| | 4-6 hours | 31 (79.5) | 8 (20.5) | 0 (0) | |
| | More than 6 | 9 (69.2) | 3 (23.1) | 1 (7.7) | |
| Reason of internet use | Email check | 63 (87.5) | 9 (12.5) | 0 (0) | *P < 0.001 |
| | Scientific | 151 (95.6) | 7 (4.4) | 0 (0) | |
| | Hobby | 117 (89.3) | 13 (9.9) | 1 (0.8) | |
| Place of internet use | Home | 218 (92) | 18 (7.6) | 1 (4) | *P = 0.325 |
| | University | 105 (90.5) | 11 (9.5) | 0 (0) | |
| | Coffee Net | 7 (100) | 0 (0) | 0 (0) | |
| | Work place | 7 (87.5) | 1 (12.5) | 0 (0) | |
| Status of residence | Dormitory | 117 (91.4) | 10 (7.8) | 1 (0.8) | *P = 0.064 |
| | Rented home | 12 (100) | 0 (0) | 0 (0) | |
| | With family | 208 (90.8) | 21 (9.2) | 0 (0) | |

| | | No risk IA (n=341)91.4% | Potential risk IA (n=31)8.3% | High risk IA (n=1)0.3% | P value |
|-------------------------------|-----------------------|----------------------------|---------------------------------|---------------------------|------------|
| Employment status | Employed | 102 (96.2) | 4 (3.8) | 0 (0) | *P = 0.097 |
| | Not employed | 238 (89.8) | 26 (9.8) | 1 (0.4) | |
| Parents educational status | Elementary | 50 (90.9) | 5 (9.1) | 0 (0) | *P = 0.767 |
| | Secondary | 56 (94.9) | 3 (5.1) | 0 (0) | |
| | High School | 131 (90.3) | 14 (9.7) | 0 (0) | |
| | College | 99 (90.8) | 9 (8.3) | 1 (0.9) | |
| Regular sleep time | Mostly regular | 31 (91.2) | 3 (8.8) | 0 (0) | *P = 0.049 |
| | Always regular | 164 (95.3) | 8 (4.7) | 0 (0) | |
| | Sometimes | 85 (87.6) | 11 (11.3) | 1 (1) | |
| | Most not regular | 48 (84.2) | 9 (15.8) | 0 (0) | |
| | always not regular | 13 (100) | 0 (0) | 0 (0) | |

* Chi-square test

Distribution of dietary behaviors and its levels among students are provided in Table 2. It shows that the majority of students had weak dietary behavior in planning ahead 69.2% (258), High fat

eating 58.2% (217), emotional eating 57.6% (215), meal skipping 49.9% (186), snacking 41.3% (154) and poor dietary pattern 21.7% (81).

Table 2. Distribution of Dietary behaviors levels among students

| Dietary behavior | Weak | Moderate | Good |
|----------------------|------------|------------|----------|
| High fat eating | 217 (58.2) | 142 (38.1) | 14 (3.8) |
| Snacking | 154 (41.3) | 208 (55.8) | 11 (2.9) |
| Emotional eating | 215 (57.6) | 148 (39.7) | 10 (2.7) |
| No planning ahead | 258 (69.2) | 108 (29) | 7 (1.9) |
| Meal skipping | 186 (49.9) | 178 (47.7) | 9 (2.4) |
| Poor dietary pattern | 81 (21.7) | 260 (69.7) | 32 (8.6) |

Based on the findings of table 3, there is a significant relationship between internet addiction levels and dietary behavior of students in high fat

eating dimension, snacking, emotional eating and poor dietary pattern.

Table 3. Dietary behavior based on the level of internet addiction among students

| Dietary behavior domains | | No risk | Potential risk | High risk | P value |
|--------------------------|----------|------------|----------------|-----------|------------|
| High fat eating | Weak | 196 (90.3) | 21 (9.7) | 0 (0) | *P = 0.004 |
| | Moderate | 132 (93) | 9 (6.3) | 1 (0.7) | |
| | Good | 13 (92.2) | 1 (7.1) | 0 (0) | |
| Snacking | Weak | 133 (86.4) | 20 (13) | 1 (0.6) | *P < 0.001 |
| | Moderate | 197 (94.7) | 11 (5.3) | 0 (0) | |
| | Good | 11 (100) | 0 (0) | 0 (0) | |
| Emotional eating | Weak | 200 (93) | 15 (7) | 0 (0) | *P < 0.001 |
| | Moderate | 132 (89.2) | 15 (10.1) | 1 (0.7) | |
| | Good | 9 (90) | 1 (10) | 0 (0) | |
| No planning ahead | Weak | 237 (91.9) | 20 (7.8) | 1 (0.4) | *P = 0.111 |
| | Moderate | 98 (90.7) | 10 (9.3) | 0 (0) | |
| | Good | 6 (85.7) | 1 (14.3) | 0 (0) | |

| Dietary behavior domains | | No risk | Potential risk | High risk | P value |
|--------------------------|----------|------------|----------------|-----------|------------|
| Meal skipping | Weak | 169 (90.9) | 16 (8.6) | 1 (0.5) | *P = 0.180 |
| | Moderate | 164 (92.1) | 14 (7.9) | 0 (0) | |
| | Good | 8 (88.9) | 1 (11.1) | 0 (0) | |
| Poor dietary pattern | Weak | 64 (79) | 16 (19.8) | 1 (1.2) | *P < 0.001 |
| | Moderate | 245 (94.2) | 15 (5.8) | 0 (0) | |
| | Good | 32 (100) | 0 (0) | 0 (0) | |

* Chi-square test

Discussion

This study was conducted to aim the assessment of relationship between internet addiction and dietary behavior among students. Based on the results of this study, the majority of the students had no internet addiction. Also, there was a statistical significant correlation between levels of internet addiction and dietary behavior in high-fat diets, snacking, emotional eating behavior and poor dietary pattern. Based on our study results among students with more than six hours internet use per day, were at high risk of internet addiction. Ross et al study also reports that the people with internet addiction had the internet use near 40 to 55 hours per week (21).

Several reasons including email check, scientific use, hobby and etc., were reported in our study for using the internet. Most of them had scientific reasons for use. Tabrizi et al (2010) also reported that among the internet users in Iran, the majority of them use chat rooms (22). About the results of this study on the correlation between sleep disorders and sleep time with internet addiction; another study in 2011 by Jacobsen and Forste, mentioned the same from the study of Kubey et al 2001(23).

The findings of this study showed that majority of students were not addicted to the internet and only 0.3% of students were at high risk of internet addiction. This is consistent with another study that 1.7% students were addicted to the Internet (24).

A study on middle school students in Guangzhou reported that majority of users were the typical users without internet addiction (25). These data are similar to our results. In another survey of internet addiction among students of Payame Noor University in 2009, 8.3% were involved with mild internet addiction (26). The study in the Faculty of Education and Psychology

also found that more than half of the students had no internet addiction (18). Based on the Shek study and Young questionnaire, nineteen percent of the respondents could be identified as internet addicted (27). The result of this study is different and it can be due to differences in study population and platform of the internet. It seems these findings could be known as the risk rising of the disorder among students and sounds the need for proper planning in this area in collaboration with university officials.

The results of this study show the majority of students have weak dietary behavior, especially the dimensions of planning ahead and the dietary pattern. Study shows that students regarding dietary habits are in unfavorable condition (28). Stefańska showed that the balance in daily nutrient diet among the students of the Medical University of Bialystok was low for carbohydrates, fats and fiber; that with the findings of this study are consistent (29).

According to the result of a study, the performance level of food consumption behavior in 14% of the students was at a weak level (30). As well as, in the other study of Karachi university students, with awareness of proper dietary behavior, unfavorable dietary behavior and need to diet modification were observed (31).

The study of Alzayani et al showed that medical science group students did not eat breakfast on a regular basis while they ate the majority of lunch and dinner regularly. So that one-third of the students ate breakfast 3 to 5 days a week, two-thirds ate lunch daily and half of the students also ate dinner 6 to 7 days a week. Another study shows dietary behavior of the Arabian Gulf University medicine students not adhered to recommended nutritional patterns and food consumption patterns. Students frequently removed their meals and had

unfavorable dietary behavior that with the findings of this study are consistent (32).

According to the studies done in United States universities, students did not use a sufficient amount of recommended fruits and vegetables. They had difficulty in feeding behavior, and were increasing amounts of high-fat foods (33). Also the study in China on dietary behavior in nursing, medicine, para-medical and basic medical sciences students, resulted the majority taking vegetables every day and third sweet foods consumed more than 3 days a week. The study also recommended that it is necessary to be more attentive to the issue of dietary behavior modification and to encourage students to healthy lifestyle (34). A study determined weak dietary behavior and a history of weight increase in students. Regarding the students' dietary patterns, there was deficient fruit and vegetable consumption (35).

Regarding dietary behavior among students by internet addiction levels, the result shows a significant relationship between internet addiction levels and high fat eating dimension, snacking, emotional eating and poor dietary pattern. Kim et al reported irregular dietary behaviors in the internet addicted users, due to loss of appetite, high rate of skipping meals, and nutritional imbalances. The study also showed lower nutrition quality in those who had an internet addiction than those who were at risk internet addiction or no risk internet addiction (10). Our study also has the same results.

In a study Kim et al demonstrated that high-risk internet users take smaller meals, have less of an appetite, skip meals, and snack more than their potential-risk and normal-risk internet user counterparts. Also the frequency of skipping dinner in high-risk internet users was significantly higher than that in no risk internet users (36).

High-risk internet users not only consumed too little of the recommended food groups; but also more than the recommended daily quantities of fatty foods, fried foods, salt, and high sugars. It is reported that high fat intake increases the chance of being overweight or obese (16).

The diet of high-risk internet users, though, may meet their energy requirements, lack nutritional

value, and may cause nutrition-related health problems.

Another study also determined that obese adolescents were more likely to have internet addiction and low quality of life (10). The results of another study is reported lower self-control among internet addicted, which causes health problem (36).

Since the students are in a change from transitional period from adolescence to new era in college students, and it has undergone numerous changes in personal behavior and habits, depending on relationships' type, learned behaviors can be transient or stable. The dietary studies for students are significant because of their potential influence on long-term health status in the future.

Conclusions

Attention to the results of this study and other studies that represent internet addiction prevalence among students and impairing nutritional behavior among them. However, the prevalence of internet addiction among our study populations was lower than previous studies in colleges; due to the significant correlation of internet addiction with dietary behavior; it seems strategic planning is essential to prevent the development of internet addiction and its complications. Hence, future research is recommended to investigate in a variety of college student communities. Research on considering the empowerment elements for the university students, using the benefits of the internet without negative effect on their health and dietary behavior also is proposed.

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assured that they can withdraw from the study at any time and data will be secure.

Conflict of Interest

None declared

Authors' contribution

A. D and A. D; Designing the study and writing of manuscripts, Edit and review the article, and Final approval of the manuscript version, A. B;

Experimental work, Data collection and participation in the concept of study, A. D; prepared a draft of the manuscript, analyzed the data, A. D; Supervised experimental work, validity and reliability of questionnaires and critically revised the manuscript for important intellectual content and interpretation of the data. All authors made a significant contribution to the concept of study.

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