Original Article

Perceived stress and eating behavior among residents in a teaching hospital

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Abstract

Objectives: This study aimed to estimate the association between perceived stress and eating behavior among residents in a tertiary teaching hospital in Riyadh, Saudi Arabia. **Methods:** A total of 305 residents were invited from seven major specialties in King Saud University Medical City to participate in this cross-sectional study, and among them, 214 completed the questionnaire between April 2019 and January 2020. The questionnaire evaluated stress and eating behavior using the 4-item Perceived Stress Scale and Dutch Eating Behavior Questionnaire, respectively. Moreover, items related to socio-demographic data, weekend coverage per month, night duties per month, fast food, snacks, and vegetables and fruits intake were included. **Results:** We found a weak positive correlation at the significance level ($P < 0.05$) between the level of stress and both the clearly labeled emotions (0.184) and emotional eating (0.171). Furthermore, there was a significant effect of specialty, Wilk's Lambda =0.858, F (30, 814) =1.062, $P = 0.030$. Among residents who performed 4 to 6-night duties per month, a significant correlation existed between stress and abnormal eating behaviors. **Conclusion:** Our findings demonstrated a positive correlation between stress, night duties, and abnormal eating behaviors. Furthermore, the results suggested unhealthy dietary habits and food choices among residents.

Keywords: Eating behavior, residents, stress.

Introduction

Stress is defined as the "perception of threat, with resulting anxiety discomfort, emotional tension, and difficulty in adjustment."[1] Residents encounter multiple types of stress during the time of training.[2] Various studies have reported high levels of perceived stress among residents in the United States of America,[3] Italy,[4] and Turkey.[5] However, in Saudi Arabia, the perceived stress levels were equal or marginally higher than that in the residents of other parts of the world.[6] The natural homeostasis of a creature is challenged by stress that may result in a physiological response to return to the equilibrium state; one of such disturbed homeostases is eating behavior.[7] Eating behavior is "a complex interplay of physiologic, psychological, social, and genetic factors that influence meal timing, the quantity of food intake, food preference, and food selection."[8] It is influenced physiologically through hormonal interactions and stress.[9,10] The decreased levels of leptin and insulin are associated with stress, leading to changes in appetite.[11] Stress evokes a response from the hypothalamic-pituitary-adrenal axis, resulting in a cortisol secretion that may alter appetite and cause overconsumption of a high-calorie diet, thus leading to weight gain.[9,10] Research has found that energy-dense food was sought and ingested in response to work-related stress.[11] Several studies have reported an association between stress and a higher intake of fast foods and snacks.[11-13] Moreover, stress increased the intake of fat and sodium.[14] In addition, stress was associated with a decreased intake of vegetables and fruits.[11,15,16]

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In contrast, some studies have found stress to reduce food intake and induce meal skipping.[16-18] Furthermore, in a previous study, no significant relation was found between stress and food intake among participants.[19] Studies conducted on college students and low-income women concluded that participants with high levels of stress had uncontrolled and emotional eating behaviors.[13,20] In a study conducted on nurses in Saudi Arabia, stress was positively associated with all abnormal eating behaviors, with restrained eating being more reported by participants than emotional and external eating.[11] Restrained eating influenced by stress was associated with increased ingestion of fast foods and snacks and is more likely to be associated with overeating than usual or binge eating.[9,11] Food selections reported by external eaters under stress were different between genders.[11] Individuals with emotional eating are more likely to overeat as a coping mechanism under stress, with snack foods being highly ingested.[9,11] Lastly, stress can influence eating behaviors that may lead to obesity,[21] and eating disorders.[22]

In 2020, a study conducted by Choi[23] explored the effect of stress on eating and dietary behaviors among nursing students in Korea. The findings of the study showed that there was a significant association between the nursing students' perceived stress and their eating behaviors, which significantly affected their weight gain and caused a significant increase in their body mass index (BMI). A more recent study by Hun *et al.*,[24] reported that anxiety and other mental health disturbances significantly ed the eating behaviors of individuals. However, the context of this study was limited to immigrants and not included health care workers.

Moreover, within the context of adolescents, a study conducted by Wang and colleagues[25] reported that there was a significant association between stress and eating behaviors among Chinese adolescents.

Despite the various cross-sectional studies that investigated the association of stress and other mental health issues and eating behaviors, there was a significant lack of studies that examined this association within the context of health care workers, especially among physicians. Therefore, this study aimed to estimate the association between perceived stress and eating behavior among residents in a tertiary teaching hospital in Riyadh, Saudi Arabia.

Relevance to the Practice of Primary Care Physicians

The present study provided research-based evidence of the association between stress and eating behaviors among physicians, which could be significantly used to establish both educational and training programs that enhance the coping abilities of the physicians to deal with stressful situations and events during their professional practice. The effect of designing such programs might remarkably improve the quality of the health care services provided for patients and improve the professional experience of the physicians in different health care settings and facilities.

Methodology

An observational cross-sectional study was conducted on the residents of the following seven largest specialties at King Saud University Medical City (KSUMC), Riyadh, Saudi Arabia: family medicine, pediatrics, obstetrics and gynecology, radiology, emergency medicine, internal medicine, and general surgery. These specialties were the most common in a study conducted in Saudi Arabia, which examined stress among residents.[6] A pilot study, including 10 residents, was conducted, and 30% of them had emotional, external, and restrained eating behaviors. Considering this 30% as the outcome variable with a width of $\pm$ 5% at $P < 0.05$ level of significance (95% confidence interval), the calculated sample size was 323. The number of residents in these specialties in KSUMC was 305 because of which all residents were included.

Based on the literature review, a questionnaire was developed in English as it is used by all Saudi and non-Saudi residents. Moreover, the purpose of the study and the right of the participant to withdraw at any time without any obligation toward the study team were explained to all participants, and the participants were informed that completing the survey was considered consent to participate voluntarily. Ethical approval to conduct the study was obtained from the Institutional Review Board (IRB) at the Faculty of Medicine at King Saud University in Riyadh in March 2019, IRB approval number (E-19-3723). The data were collected using paper questionnaires but for those we could not reach, we used electronic questionnaires (using Google forms). Two reminders were sent to non-responders. Surveys were distributed between April 2019 and January 2020.

The questionnaire included socio-demographic characteristics (age, gender, nationality, and marital status). Items related to work schedules (night duties and weekend coverage) were included; the participants were asked to document how many night duties do they perform per month (no duties, 1 to 3, 4 to 6, or more than 6) and how many weekend coverages they do per month (no coverage, one, two, three, or four).

The frequency of eating fast foods and snacks was asked to determine the dietary habits of the participants (never, sometimes, often, or almost every day). In addition, a question on how many servings of fruits and vegetables a participant would eat per day was included (five or more, four, three, two, or less than two); one serving measured as a one medium-size fruit; half a cup of vegetables, fruit, or juice; or one cup of salad. One item was related to binge eating in which participants were asked how often during the past 12 months they were engaged in the episodes of binge eating, an eating binge is defined as an episode of eating an amount of food that others would regard unusually large.[26]

The 4-item Perceived Stress Scale (PSS) developed by Cohen *et al*.[27] was used in the study. The PSS "measures the degree to which situations in one's life are appraised as stressful."[27] For estimating the perception of stress, PSS is the most generally used psychological tool. All items in the scale were rated from 0 to 4 (0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often) with scores from 0 to 16. As no published cutoff scores exist for stress to be considered high or low, a PSS of more than 11 was classified as high stress and less than 6 as low stress.[11]

Eating behavior is "a complex interplay of physiologic, psychological, social, and genetic factors that influence meal timing, the quantity of food intake, food preference, and food selection."[8] We used the Dutch Eating Behavior Questionnaire (DEBQ),[26] containing 33 self-reported items. The permission to use was obtained from the authors by email. It measures three unhealthy eating behaviors: emotional eating (13 questions), which is "the tendency to cope with negative emotions (for example, anxiety or irritability),"[11] including two subscales for negative emotions that are clearly labeled emotions (such as frightened and worried) and diffuse emotions (such as bored and lonely)[28]; restrained eating (10 questions), which "refers to overeating when the cognitive resolve to diet is abandoned after a period of slimming"[29]; and external eating (10 questions), which is "the extent to which external cues of food trigger eating episodes (for example, the reinforcing value of the sight and smell of attractive food)."[11] All items in the questionnaire were rated on a 5-point Likert-type scale, with each response having a value ranging from 1 = never to 5 = very often. We stratified scores of eating styles as a "yes" if it is greater than the 75th percentile and "no" if it is equal or less than the 75th percentile.[11] The DEBQ has a superior construct and predictive validity and high internal consistency (reliability between 0.80 and 0.95).[11,26,29]

The data were analyzed using the Statistical Package for the Social Sciences version 26. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used. In addition, Pearson's correlation factors were used to find out the relationship between stress and eating behaviors among the study participants, i.e. the association between stress and eating behaviors with respect to the participants' specialty, number of night duties per month, and frequency of being eating. A *P* value of < 0.05 was considered significant. These three factors were investigated as they were the most reported variables influencing the association of perceived stress and eating behaviors among medical staff.

Results

We received 214 completed surveys, giving a response rate of 70.1%. As shown in Table 1, the demographic characteristics of the study participants indicated that 52.3% were female and 47.7% were male. Of the participants, the mean age was 27.03 years, and the majority of them were Saudi (95.3%). Moreover, 70.1% of the participants were single. Maximum participants were family medicine residents (26.2%), followed by pediatrics residents (17.3%), and general surgery residents being the least (6.5%).

The first-year residents constituted 32.2% of the study participants, with the second, third, and fourth or more year residents representing 25.2%, 22.4%, and 20.1%, respectively.

A total of 88 participants (41.4%) reported that they covered two weekends per month, 26.2% did not cover at the weekends, 24.3% covered once a month, and 5.6% and 2.8% covered three and four weekends per month, respectively. Moreover, 38.3% of the study participants reported eating fast foods sometimes, 34.6% ate fast foods often, and 20.1% ate fast foods daily.

With respect to eating snack habits among the study participants, 40.7% sometimes ate snacks, 27.6% often ate snacks, and 21% ate snacks daily. A total of 66.8% of the study participants reported that they had less than two daily servings of vegetables and fruits, and 17.3% reported that they had two daily servings of vegetables and fruits.

Investigating the frequency of binge eating episodes revealed that 33.6% of the study participants were not engaged in any eating episodes during the past 12 months, and 29% were engaged in eating episodes less than weekly. Moreover, eating episodes once a week and two or more times a week were reported among 21.5% and 15.9% of the study participants, respectively.

Table 2 represents Pearson's correlation coefficients between the level of stress and eating behaviors among the residents. The findings indicated a weak positive correlation at the significance level ($P < 0.05$) between the level of stress and both the clearly labeled emotions (0.184) and emotional eating (0.171). However, no significant correlation existed between the level of stress and diffused emotions, external eating, and restrained eating domains.

To examine the linearity of the relationship, scatterplots were generated for both variables [Figures 1 and 2].

Table 3 shows that there was a significant effect of specialty, Wilk's Lambda =0.858, F (30, 814) =1.062, $P = 0.030$. A significant correlation exists between stress and eating behaviors among residents due to their specialty.

Table 4 shows that there was a significant effect of the number of night duties per month, Wilk's Lambda =0.893, F (15, 569.077) =1.583, $P = 0.037$. A significant correlation existed between stress and eating behaviors among residents due to the number of night duties per month.

Table 5 shows that there was no significant effect of the frequency of binge eating, Wilk's Lambda =0.726, F (15, 569.077) =4.672, $P = 0.101$. No significant correlation existed between stress and eating behaviors among residents due to the frequency of binge eating.

Table 1: Socio-demographic characteristics of the study sample

Variable	M (SD)	*F* (%)	Range (Min-Max)
Age (in years)	27.03 (1.809)		(24-37)
Gender			
Female		112 (52.3)	
Male		102 (47.7)	
Nationality			
Saudi		204 (95.3)	
Non-Saudi		10 (4.7)	
Marital status			
Married		63 (29.4)	
Single		150 (70.1)	
Divorced or widowed		1 (0.5)	
Specialty			-
Family medicine		56 (26.2)	
Pediatrics		37 (17.3)	
Obstetrics and Gynecology		24 (11.2)	
Internal medicine		29 (13.6)	
General surgery		14 (6.5)	
Emergency		23 (10.7)	
Radiology		31 (14.5)	
Residence year			-
First		69 (32.2)	
Second		54 (25.2)	
Third		48 (22.4)	
Fourth or more		43 (20.1)	
Night duties per month			
No duties		50 (23.4)	
1-3		55 (25.7)	
4-6		98 (45.8)	
More than 6		11 (5.1)	
Weekend coverage per month			
No coverage		56 (26.2)	
One		52 (24.3)	
Two		88 (41.4)	
Three		12 (5.6)	
Four		6 (2.8)	
How often do you eat fast food?			
Never or rarely		15 (7.0)	
Sometimes		82 (38.3)	
Often		74 (34.6)	
Almost everyday		43 (20.1)	
How often do you eat snacks?			
Never or rarely		23 (10.7)	
Sometimes		87 (40.7)	
Often		59 (27.6)	
Almost every day		45 (21.0)	
How many servings of fruits and vegetables do you eat daily?			
Less than two		143 (66.8)	
Two		37 (17.3)	
Three		25 (11.7)	
Four		5 (2.3)	
Five or more		4 (1.9)	
How often during the past 12 months you had engaged in episodes of being eating?			
Not at all		72 (33.6)	
Less than weekly		62 (29.0)	
Once a week		46 (21.5)	
Two or more times a week		34 (15.9)	

Discussion

In this study, emotional eating behavior and clearly labeled emotions were positively correlated with a high level of perceived stress among residents, which is in line with the findings of multiple previous studies among different populations. For example, the association was found among low-income women in the United States,[20] and college students in Brazil.[13] Moreover,

Table 2: Pearson's correlation coefficients between the level of stress and eating behaviors among residents

Variable	Diffused emotions	Clearly labeled emotions	Emotional eating	External eating	Restrained eating
Stress					
Correlation coefficient	0.102	0.184**	0.171*	0.090	-0.030
Sig (2-tailed	0.113	0.007	0.012	0.188	0.534
n	214	214	214	214	214

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed)

Table 3: One-way multivariate analysis for the association between the level of stress and eating behaviors among residents according to their specialty

Multivariate Tests[a]						
Effect	**Value**	***F***	**Hypothesis df**	**Error df**	**Sig.**	**Partial Eta Squared**
Specialty						
Pillai's Trace	0.148	1.053	30.000	1035.000	0.389	0.030
Wilks' Lambda	0.858	1.062	30.000	814.000	0.378	0.030
Hotelling's Trace	0.159	1.070	30.000	1007.000	0.366	0.031
Roy's Largest Root	0.107	3.698[c]	6.000	207.000	0.002	0.097

[a]Design: Intercept + Specialty, [b]Exact statistic, [c]The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 4: One-way multivariate analysis of variance for the association between the level of stress and eating behaviors among residents according to the number of duties per month

Multivariate Tests[a]						
Effect	**Value**	***F***	**Hypothesis df**	**Error df**	**Sig.**	**Partial Eta Squared**
Night duties per month						
Pillai's Trace	0.110	1.577	15.000	624.000	0.075	0.037
Wilks' Lambda	0.893	1.583	15.000	569.077	0.074	0.037
Hotelling's Trace	0.116	1.587	15.000	614.000	0.072	0.037
Roy's Largest Root	0.078	3.251[c]	5.000	208.000	0.008	0.072

[a]Design: Intercept + Night duties per month, [b]Exact statistic, [c]The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 5: One-way multivariate analysis of variance for the association between the level of stress and eating behaviors among residents according to the frequency of binge eating

Multivariate Tests[a]						
Effect	**Value**	***F***	**Hypothesis df**	**Error df**	**Sig.**	**Partial Eta Squared**
Frequency of binge eating						
Pillai's Trace	0.288	4.423	15.000	624.000	0.000	0.096
Wilks' Lambda	0.726	4.672	15.000	569.077	0.000	0.101
Hotelling's Trace	0.359	4.896	15.000	614.000	0.000	0.107
Roy's Largest Root	0.298	12.414[c]	5.000	208.000	0.000	0.230

[a]Design: Intercept + Frequency of Binge Eating, [b]Exact statistic, [c]The statistic is an upper bound on F that yields a lower bound on the significance level.

stress was associated with emotional eating and other abnormal eating behaviors among nurses in Hong Kong, China,[29] and Riyadh, Saudi Arabia.[11] Also, a significant correlation existed between stress and eating behaviors among residents due to their specialty. These results suggest that when residents are under stress, food decisions are influenced more by emotional factors, leading to difficulty in managing the amount and volume of food eaten. Moreover, this eating behavior serves as a coping mechanism for negative emotions.

Stress had a significant correlation with abnormal eating behavior among residents who had 4 to 6 night duties per month. Our findings were similar to that in the previous research conducted on nurses[11,29] and other night-shift workers.[30] This may be because those who work on night duties may seek high-energy food such as snacks and fast foods to compensate for interrupted circadian rhythm, lack of energy, and heavy workload that significantly affect their eating behaviors.[11,29] In this study, no significant correlation was found between binge eating and eating behaviors, which is not in line with previous research that suggests a strong association between binge eating and abnormal eating behaviors, specifically restrained eating.[11,31]

The dietary habits and choices of food of residents were unhealthy; 66.8% of the residents reported that they have less than two daily servings of vegetables and fruits and only 1.9% reported eating five servings or more, which is the recommended daily intake of fruits and vegetables by the American Heart

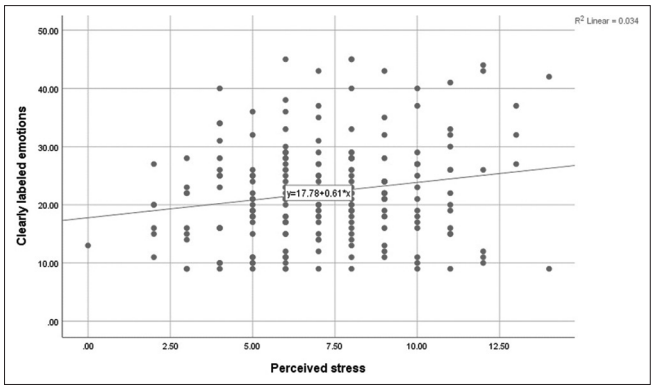

Figure 1: Linear association between the participants' perceived stress and the clearly labeled emotions.

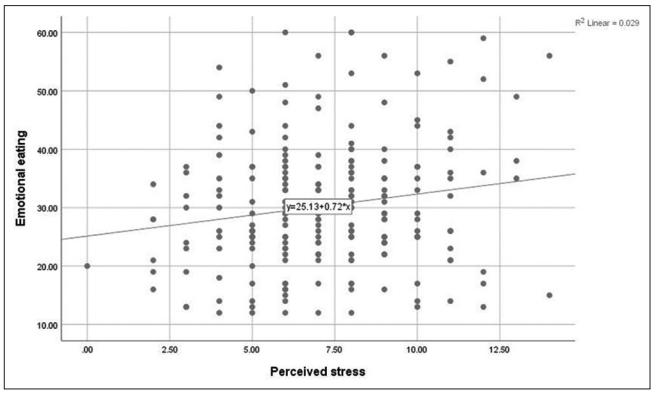

Figure 2: Linear association between the participants' perceived stress and the emotional eating

Association. In addition, fast food intake was reported as often and daily by 34.6% and 20.1% of the residents, respectively. In addition, the consumption of snacks was reported as often and daily by 27.6% and 21% of the residents, respectively. These unhealthy food habits could be because of a lack of education and unavailability of healthy food choices, particularly outside day working hours.

Limitations

The participants were selected from one hospital (KSUMC), with nearly a modest sample size and response rate that may limit the generalizability of the results. The cause and effect could not be assessed because of the cross-sectional study design. Lastly, the self-reported survey has the potential of recall mistakes.

Conclusion

In conclusion, this study estimated the association between stress and eating behaviors considering multiple confounders among residents in KSUMC. Our findings demonstrated a positive correlation between stress, night duties, and abnormal eating behaviors. Furthermore, the results suggested unhealthy dietary habits and food choices among residents. Therefore, it is recommended that hospitals provide stress-relieving programs, educational programs to promote healthy eating, and provide healthy food choices for residents, particularly for those having night duties.

Key Points

- Stress, as other mental health disturbances, significantly affects individuals' dietary behaviors.
- Primary care physicians are among the highest categories exposed to stressful situations that could increase their stress levels.
- Lack of stress coping strategies among physicians could significantly exacerbate the consequences, which might include negative changes in eating behaviors.
- Emotional eating behavior and clearly labeled emotions were positively correlated with a high level of perceived stress among residents.
- Stress had a significant correlation with abnormal eating behavior among Saudi residents who had 4 to 6 night duties per month.
- No significant correlation was found between binge eating and eating behaviors.

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Conflicts of interest

There are no conflicts of interest.

References

1. Fink G. Stress: Definition and History. Encyclopedia of Neuroscience. 2009. p. 549-55.
2. Lourencao LG, Moscardini AC, Soler ZA. [Health and quality of life of medical residents]. Rev Assoc Med Bras (1992) 2010;56:81-91.
3. Lebensohn P, Dodds S, Benn R, Brooks AJ, Birch M, Cook P, *et al.* Resident wellness behaviors: Relationship to stress, depression, and burnout. Fam Med 2013;45:541-9.
4. Concerto C, Conti C, Muscatello MR, Signorelli MS, Zoccali R, Coira D, *et al.* Sleep quality, perceived stress, and caffeinated drinks intake in psychiatry residents: A cross-sectional study. J Caffeine Res 2017;7:18-22.
5. Abut YC, Kitapcioglu D, Erkalp K, Toprak N, Boztepe A, Sivrikaya U, *et al.* Job burnout in 159 anesthesiology trainees. Saudi J Anaesth 2012;6:46-51.
6. Alosaimi FD, Kazim SN, Almufleh AS, Aladwani BS, Alsubaie AS. Prevalence of stress and its determinants among residents in Saudi Arabia. Saudi Med J 2015;36:605-12.
7. Yau YH, Potenza MN. Stress and eating behaviors. Minerva Endocrinol 2013;38:255-67.
8. Grimm ER, Steinle NI. Genetics of eating behavior: Established and emerging concepts. Nutr Rev 2011;69:52-60.
9. Scott C, Johnstone AM. Stress and eating behaviour: implications for obesity. Obes Facts 2012;5:277-87.
10. George SA, Khan S, Briggs H, Abelson JL. CRH-stimulated cortisol release and food intake in healthy, non-obese adults. Psychoneuroendocrinology 2010;35:607-12.
11. Almajwal AM. Stress, shift duty, and eating behavior among nurses in Central Saudi Arabia. Saudi Med J 2016;37:191-8.

12. Barrington WE, Beresford SA, McGregor BA, White E. Perceived stress and eating behaviors by sex, obesity status, and stress vulnerability: Findings from the vitamins and lifestyle (VITAL) study. J Acad Nutr Diet 2014;114:1791-9.
13. Penaforte F, Matta N, Japur C. Association between stress and eating behavior in college students. Demetra Food Nutr Health 2016;11:225-38.
14. Nastaskin RS, Fiocco AJ. A survey of diet self-efficacy and food intake in students with high and low perceived stress. Nutr J 2015;14:42.
15. Motohashi K, Kaneko Y, Fujita K, Motohashi Y, Nakamura A. Interest in dietary pattern, social capital, and psychological distress: A cross-sectional study in a rural Japanese community. BMC Public Health 2013;13:933.
16. Jasim N Al-Asadi. Perceived stress and eating habits among medical students. Int J Med Pharm Sci 2014;4:81-90.
17. El Ansari W, Berg-Beckhoff G. Nutritional correlates of perceived stress among university students in Egypt. Int J Environ Res Public Health 2015;12:14164-76.
18. Pelletier JE, Lytle LA, Laska MN. Stress, health risk behaviors, and weight status among community college students. Health Educ Behav 2016;43:139-44.
19. Carson TL, Desmond R, Hardy S, Townsend S, Ard JD, Meneses K, *et al*. A study of the relationship between food group recommendations and perceived stress: Findings from black women in the Deep South. J Obes 2015;2015:203164.
20. Richardson AS, Arsenault JE, Cates SC, Muth MK. Perceived stress, unhealthy eating behaviors, and severe obesity in low-income women. Nutr J 2015;14:122.
21. Tomiyama AJ. Stress and obesity. Annu Rev Psychol 2019;70:703-18.
22. Hardaway JA, Crowley NA, Bulik CM, Kash TL. Integrated circuits and molecular components for stress and feeding: Implications for eating disorders. Genes Brain Behav 2015;14:85-97.
23. Choi, Jinkyung. Impact of stress levels on eating behaviors among college students. Nutrients 2020;12:1241.
24. Hun N, Urzúa A, López-Espinoza A. Anxiety and eating behaviors: Mediating effect of ethnic identity and acculturation stress. Appetite 2021;157. doi: 10.1016/j.appet. 2020.105006.
25. Wang Z, Wang B, Hu Y, Cheng L, Zhang S, Chen Y, *et al*. Relationships among weight stigma, eating behaviors and stress in adolescents in Wuhan, China. Glob Health Res Policy 2020;5:8. doi: 10.1186/s41256-020-00138-3.
26. Van Strien T, Frijters JE, Bergers GP, Defares PB. The Dutch eating behavior questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. Int J Eat Disord 1986;5:295-315.
27. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav 1983;24:385-96.
28. Schneider KL, Panza E, Appelhans BM, Whited MC, Oleski JL, Pagoto SL. The emotional eating scale. Can a self-report measure predict observed emotional eating? Appetite 2012;58:563-6.
29. Wong H, Wong MC, Wong SY, Lee A. The association between shift duty and abnormal eating behavior among nurses working in a major hospital: A cross-sectional study. Int J Nurs Stud 2010;47:1021-7.
30. Lowden A, Moreno C, Holmback U, Lennernas M, Tucker P. Eating and shift work – effects on habits, metabolism and performance. Scand J Work Environ Health 2010;36:150-62.
31. Nolan LJ, Geliebter A. Night eating is associated with emotional and external eating in college students. Eat Behav 2012;13:202-6.