

# The relationship between food frequency and menstrual distress in high school females

Soheila Mohamadirizi<sup>1</sup>, Masoumeh Kordi<sup>2</sup>

## ABSTRACT

**Background:** Nutrition pattern is one of the important factors predicting menstrual distress, which varies among different cultures and countries. The purpose of this study is to determine the relationship between food frequency and menstrual distress in high school girls from Mashhad.

**Materials and Methods:** This cross-sectional study was conducted in 2012 using a two-stage sampling method on 407 high school female students from Mashhad who met the inclusion criteria. Subjects completed questionnaires of demographic characteristics, food frequency, and Menstrual Distress Questionnaire (MDQ) during three phases of the menstrual cycle (a week before bleeding, during menstrual bleeding period, and a week after menstruation). The collected data were analyzed by statistical tests such as Pearson correlation coefficient test, independent Student's *t*-test, and one-way analysis of variance (ANOVA).

**Results:** Results showed that 87.7% of the students were at moderate economic status, 82.2% were exposed to cigarette smoke, 94.8% had mothers without university education, and 9.4% had working mothers. About 71% of the students reported minor pre-menstruation distress, 81% reported minor distress during bleeding, and 39% reported minor post-menstruation distress. In addition, the mean (SD) values for sweet-fatty foods, salty-fatty foods, fast foods, and caffeine were 3.6, 3.3, 1.3, and 10.2 per week, respectively. In addition, Pearson correlation coefficient test showed no significant correlation between total menstruation distress and food frequency ( $P > 0.05$ ).

**Conclusions:** With regard to the inappropriate food frequency and high intensity of menstrual distress among high school students and as health care and educational efforts for prevention and health promotion in society are among the duties of health workers, the results of this study can help the officials involved in education to emphasize on nutrition and the menstrual health of students.

**Key words:** Food frequency, menstrual distress, student

## INTRODUCTION

Menstruation has been a common experience among women from the 19<sup>th</sup> century till now and has been counted as a new issue.<sup>[1]</sup> It is the only evidence proving the continuation of fertility in women's reproduction system.<sup>[2]</sup> Each woman experiences menstruation for 400 times in her fertility age.<sup>[3]</sup> It is such that one-seventh of a woman's life is accompanied with menstruation.<sup>[4]</sup> Based on some gynecologists' viewpoint, menstruation could be a sign for women's physiological status and health, and can be used as a diagnostic tool for women's problems.<sup>[5]</sup> Meanwhile,

the problems related to menstruation impose high costs to the societies and affect not only the women's health but also their quality of life, body image, pregnancy, mood, as well as social economy and efficiency.<sup>[6]</sup> These disorders commonly occur at different ages among women, especially among girls who have newly passed menarche (during the first 2 years after their menarche) when many of their cycles are without anovulation.<sup>[7]</sup> Menstruation-related signs can start at any age after menarche and do not necessarily occur in each period, but exist in most of them and are manifested more severely in some months.<sup>[8]</sup> These signs have been vastly investigated in different cultures including western culture, while limited research has been conducted in the Middle

<sup>1</sup>Department of Midwifery, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, <sup>2</sup>Department of Midwifery School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran

**Address for correspondence:** Ms. Masoumeh Kordi, Department of Midwifery School of Nursing and Midwifery, Mashhad University of Medical Sciences, Mashhad, Iran. E-mail: kordim@mums.ac.ir

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East.<sup>[9]</sup> Menstruation-related signs and their severity vary in different stages of menstruation and in various cultures and societies.<sup>[10,11]</sup> About 95% of women in western societies and 90% of women in Asian societies face physical and psychological changes during their menstruation period.<sup>[12,13]</sup> Houston *et al.*, in a study on difference societies, showed that 21% of American, 61.4% of Turkish, and 64.6% Japanese girls reported pre-menstrual distress.<sup>[14]</sup> In addition, menstrual distress is one among the chronic disorders with no specific signs and causes, and cannot be explained by any one-factorial model due to the complicated process of menstruation, especially menstrual distress, and its association with external factors.<sup>[15,16]</sup> Menstrual distress includes physical, psychological, and behavioral signs whose associated factors have been categorized based on a bio-psychological and social model.<sup>[17]</sup> Based on this model, menstrual distress signs are found to be affected not only by a combination of psychological factors, including anxiety, depression, and environmental stress, and social factors such as interaction with friends, family, and colleagues and the attitude toward menstruation, but also by biological factors such as hormonal disorders and the lifestyle constituting physical activity and nutritional status.<sup>[18-20]</sup> With regard to the importance of diet in adolescent period and its long-term effects that can influence menstruation signs in young women, a bulk of research has been conducted on the association between lesser or highly consumed nutritional elements and the common signs of menstruation. For instance, shortage of calcium and non-saturated fatty acids is associated with dysmenorrhea.<sup>[21]</sup> It has been recently observed that young women who ignore eating breakfast significantly suffer from dysmenorrhea more, compared to those who eat breakfast, and a high-fiber diet is inversely associated with dysmenorrhea. As studies show the positive role of different diets on dysmenorrhea, recognition of their role is essential.<sup>[22]</sup> On the one hand, prevalence and severity of menstrual dysmenorrhea and women's and girls' nutritional intake are different in various cultures and in different societies. On the other hand, nutritional disorders, especially among adolescent girls, are among major health problems and act as a risk factor for the diseases such as osteoporosis, anxiety and depression, as well as menstrual disorders such as amenorrhea.<sup>[23]</sup> Therefore, paying attention to girls' nutritional status is of great importance. The researcher conducted the present study since no study has been conducted on determination of the relationship between food frequency and menstrual distress in high school girls from Mashhad.

## MATERIALS AND METHODS

The study population comprised all female students in grades one to four of a high school in Mashhad during 2011–2012. The sample size was calculated to be 370

subjects after conducting a pilot study on 10 students using the sample size formula:  $n = \frac{(z_1 + z_2)^2 (1 - r^2)}{r^2} + 2$

Taking into consideration a sample size increase of 10% due to random sampling, the final sample size was estimated to be 407 subjects. Cluster random sampling was adopted to select the subjects. The city of Mashhad was divided into six districts. Then, a location was selected in each district, and from each location, one school was selected by drawing lots. As the number of high school girls in each district was different, the number of subjects in each district was determined based on the total number of students in that district. The inclusion criteria were signing an informed consent to attend the study; being the student of either the third, fourth, fifth, or sixth year of a high school; having Iranian nationality; residing in Mashhad; having at least 2 years passed after menarche; body mass index (BMI) less than 30; not having experienced an agonizing or stressful life event during 6 months prior to study (death of an immediate family member, a severe family conflict, financial problems, a major change in lifestyle); not being a professional athlete; not being married; not being on a specific diet; not being involved in a medical problem (diabetes, thyroid disorders, Cushing disease, pituitary tumors, reproductive system diseases such as myoma, endometriosis, ovarian cysts, and inflammatory pelvic diseases); not taking psychotropic medications; and having no history of mental diseases during the year prior to study (a mental disease diagnosed by a psychiatrist or taking psychotropic medications). Data collection tools included a demographic and menstruation questionnaire, Menstrual Distress Questionnaire (MDQ), and nutrition pattern questionnaire. The MDQ was designed by Randoulf Moos in New York University in 1968. This questionnaire contains 16 items in four dimensions (pain, control, autonomic responses, and fluid accumulation) and is scored by a four-point Likert's scale from 0 (no signs) to 4 (very acute) to record menstruation-related signs a week prior to menstruation, during the bleeding phase, and 1 week after menstruation during the past year. Scores less than or equal to 16 indicate minor menstruation signs, 17–32 show moderate signs, 33–48 show severe menstruation signs, and scores over 49 are considered as very severe signs.<sup>[24]</sup> The nutrition pattern questionnaire included four main nutrients: sweet-fatty (chocolates, cake, ice cream, nuts, etc.), salty-fatty (soya, red meat, chicken meat, etc.), fast foods (hamburger, pizza, potato chips, etc.), and caffeine-containing materials (tea, coffee, etc.). The frequency of their consumption within the past year was investigated.<sup>[25]</sup> MDQ is a valid and reliable tool which was adopted in Kordi's study (2011) and its reliability was reported as Cronbach alpha of 0.96.<sup>[24]</sup> The questionnaire of food material consumption was adopted in Bakhshae's study (2012) and is a valid tool.<sup>[25]</sup> Its reliability was calculated by test re-test method in such a way that the

researcher administered the questionnaire for 20 students two times with a 1-week interval. Its reliability was approved by  $r = 0.89$  and  $P = 0.01$  in such a way that after approval of the study by ethics committee of the Mashhad University of Medical Sciences and obtaining a letter of introduction, the researcher referred to authorities of the education and training office and the selected high schools. She coordinated with them for distribution of research tools, explained the research goals to the subjects, and asked the subjects to sign an informed written consent form. Finally, keeping the ethics codes into consideration, she selected the subjects, distributed the questionnaires, and conducted the study. After consideration of the inclusion exclusion criteria and explanation of the research goals, the researcher asked the subjects to complete a three-section questionnaire including their personal and menstruation characteristics, menstrual distress, and nutrition pattern questionnaire and give it back at the end of school hours on the same day. The subjects were assured that their information would be kept confidential and the questionnaires were anonymous. Then, the researcher collected the questionnaires at the end of school hours on the same day. Data of 407 qualified students were collected and analyzed by Student's *t*-test, Mann-Whitney, one-way analysis of variance (ANOVA), Chi-square, Pearson correlation coefficient, and linear regression model through SPSS14.

## RESULTS

The mean (SD) of age at menarche was 12.78 (1.11) years, ranging from 10 to 15 years. The age, BMI, and socioeconomic status and nightly and daily sleep, physical activity and length of physical activity, and exposure to smoke have been presented in Tables 1 and 2, respectively. In addition, menstrual distress severity before menstruation, in the bleeding phase, and after menstruation was minor in 71%, 81%, and 39% of the cases, respectively. With regard to pre-menstruation signs' dimensions, fluid accumulation (retention) was observed in 33% of the subjects. Mean weekly consumption of sweet-fatty, salty-fatty, fast food, and caffeine was 3.6, 3.3, 1.3, and 10.2 times, respectively [Table 3]. Pearson

correlation coefficient test showed no correlation between the number of times the four aforementioned food substances was consumed and the total score of menstrual distress ( $P = 0.282$ ). Meanwhile, it showed a positive correlation between the number of times sweet-fatty food was consumed and the total score of post-menstrual distress signs ( $r = 0.23$ ,  $P = 0.042$ ) in such a way that an increase in sweet-fatty food consumption enhanced post-menstrual distress signs. Meanwhile, there was no significant correlation between the number of times of sweet-fatty food consumption and the total score of pre-menstrual phase and bleeding phase distress signs ( $P = 0.123$  and  $P = 0.501$ , respectively). Pearson correlation coefficient test showed a positive correlation between the number of times fast food was consumed and the total score of menstrual distress in the bleeding phase ( $r = 0.41$ ,  $P = 0.022$ ) in such a way that an increase in their consumption increased menstrual distress signs. Meanwhile, there was no significant correlation between the number of times fast food was consumed and the total score of menstrual distress before and after menstruation ( $P = 0.405$  and  $P = 0.320$ , respectively). In addition, Pearson correlation coefficient test showed no significant correlation between salty-fatty food and caffeine consumption, and menstrual distress before menstruation, during the bleeding phase, and after menstruation ( $P = 0.210$ ,  $P = 0.527$ ,  $P = 0.300$ ,  $P = 0.430$ ,  $P = 0.602$ , and  $P = 0.102$ , respectively). There was a positive correlation between sweet-fatty food consumption and BMI ( $r = 1.000$ ,  $P = 0.001$ ) in such a way that an increase in BMI increased sweet-fatty food consumption. There was a positive correlation between caffeine-containing food consumption and age at menarche ( $r = 1.000$ ,

**Table 1: Frequency distribution of age, BMI, and socioeconomic status among female students**

Personal characteristics	Age	n	%
Age (years)	14-16	230	56.5
	17-19	177	43.5
BMI	Less than 18.5	89	21.9
	18.5-24.9	270	66.3
	25-29.9	84	11.8
Socioeconomic status	Poor	20	4.9
	Moderate	357	87.7
	Good	30	7.4

BMI: Body mass index

**Table 2: Frequency distribution of nightly and daily sleep, physical activity and length of physical activity, and exposure to smoke among female students**

Personal characteristics	n	%
Sleep (h)		
Less than or equal to 8	354	87
More than 8	53	13
Daily sleep (h)		
Less than or equal to 2	307	75
More than 2	100	25
Physical activity		
Yes	149	36.6
No	258	63.4
Length of physical activity (min)		
Less than 30	79	53.1
More than 30	70	46.9
Exposure to smoke		
Yes	339	83.2
No	68	16.8

**Table 3: Frequency distribution of subjects' nutritional pattern based on the number of weekly consumptions**

Nutritional pattern	n	%
Sweet-fatty		
0-5 times a week	302	74.2
5-10 times a week	105	25.8
Salty-fatty		
0-5 times a week	312	76.7
5-10 times a week	83	20.4
More than 10 times a week	12	2.9
Fast foods		
0-5 times a week	391	96.1
5-10 times a week	9	2.2
More than 10 times a week	7	1.7
Caffeine		
0-5 times a week	156	38.3
5-10 times a week	80	19.7
More than 10 times a week	171	42

$P = 0.004$ ) in such a way that an increase in menarche age increased the consumption of caffeine-containing foods. To control the confounding factors, all variables were entered in linear regression model in such a way that the variables effective on menstrual distress and the frequency of food consumption were entered as independent variables and the two main variables were separately entered as dependent variables.

As a result, all confounding variables were controlled in this way and showed no significant association with the two main variables.

## DISCUSSION

The present study showed no significant association between salty food consumption and menstrual distress, while Molazem *et al.* in Yasouj showed that there was a significant association between the number of times of salty cucumber pickle consumption and severity of girls' dysmenorrhea. However, they measured only one of the pre-menstruation signs (pain) and just investigated one type of food (salty cucumber pickle).<sup>[21]</sup> Meanwhile, the present study investigated a collection of signs and a group of salty foods, which can be the reason for obtaining inconsistent results. In addition, cultural differences in consumption of salty or saltless foods can be another reason for the controversial results obtained. Our results showed no significant association between caffeine-containing foods including tea and coffee and any of menstrual distress signs, which is in line with the study of Bakhshani in which no significant

association was reported between consumption of tea and menstrual distress signs.<sup>[25]</sup> In addition, although some observation-based studies reported that the women complaining of more signs consumed more caffeine, the role of caffeine in menstrual distress signs is yet unclear. It needs further studies to prove whether consumption of caffeine is among the factors causing these signs or it is women's self-therapeutic response to the usual signs of fatigue to reduce their concentration on menstrual distress signs.

In addition, Dars *et al.*, in their study on female students in Hyderabad, Pakistan, showed a significant association between nutritional status and menstruation pattern,<sup>[26]</sup> which is not in line with the present study. The reason for inconsistent results can be the difference in the evaluation of nutritional status, as BMI was considered as an index for evaluation of nutritional status in their study, while in the present study, it was evaluated using a nutrition status related tool and through consideration of main nutritious substances. Although prospective recording of the signs is more accurate due to deletion of confounding factor of memory, compared to retrospective recording, lack of students' cooperation and interference of their school assignments with the study was one of our limitations. Among the strong points of the present study, random and multi-stage sampling, allocation of the subjects based on the target population of Mashhad, and equal chance of selection for the students can be mentioned. These strong points somehow increased generalization of our reported results and decreased the possibility of a bias. In addition, sampling was conducted among healthy students studying in the schools and not among those referring to health care centers who might have suffered from a disease. It should be noted that the study population in the present study had a better potentiality for generalization, compared to other studies.

Elimination of some questions in the questionnaire, including family history of menstrual disorders, can be mentioned as a limitation in the present study. In addition, despite confirming the subjects about confidentiality of their data, some diseases or menstrual distress signs may have been hidden due to social concerns. As the rapidest way to achieve a high level of public health is prevention and promotion of individuals' knowledge,<sup>[27]</sup> the researcher hopes that the obtained results can not only provide adequate knowledge about menstrual distress and nutritional consumption pattern among female students but also may help top health managers to make practical strategies and promote public education concerning menstrual distress signs and appropriate nutritional pattern of the students and their families.

## CONCLUSION

With regard to the high level of menstrual distress, and inappropriate nutritional pattern among the students, these disorders should be detected, prevented, and treated by the authorities of Ministry of Education and Training, and related educational courses and counseling services should be held to solve these problems.

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