

# Association between menstruation signs and anxiety, depression, and stress in school girls in Mashhad in 2011-2012

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## ABSTRACT

**Background:** Menstruation signs are among the most common disorders in adolescents and are influenced by various environmental and psychosocial factors. This study aimed to define the association between menstruation signs and anxiety, depression, and stress in school girls in Mashhad in 2011-2012.

**Materials and Methods:** This was a cross-sectional study on 407 high school girls in Mashhad who were selected through two-step random sampling. The students completed a questionnaire concerning demographic characteristics, menstruation, Depression, Anxiety, and Stress Scale of 21 questions (DASS-21), and menstruation signs in three phases of their menstruation. Data were analyzed by the statistical tests of Pearson correlation coefficient, Student's *t*-test, one-way analysis of variance (ANOVA), and regression through SPSS version 14.

**Results:** Based on the findings, 74% of the subjects reported pre-menstruation signs, 94% reported signs during bleeding, and 40.8% reported post-menstruation signs. About 44.3% of the subjects had anxiety, 45.5% had depression, and 47.2% had stress. In addition, Pearson correlation coefficient test showed a significant positive correlation between menstruation signs and depression, anxiety, and stress ( $P < 0.05$ ).

**Conclusion:** With regard to the association between menstruation signs and psycho-cognitive variables, prevention and treatment of these disorders by the authorities of education and training and the Ministry of Health are essential.

**Key words:** Depression, girls, menstruation

## INTRODUCTION

Menstruation disorders occur at different ages among women. These disorders are more prevalent in early puberty among girls, especially during the first 2 years of menstruation in which many periods are without ovulation. One of the most common disorders at this time is menstruation signs,<sup>[1,2]</sup> which include irritability, tender breasts, low back pain, skin outbreaks, fatigue, palpitation, social isolation, nausea and vomiting, abdominal pain (cramps), and general weakness<sup>[3]</sup> occurring before, during, or after menstruation.<sup>[4]</sup> Retrospective and prospective studies have reported the prevalence of these signs over 60%<sup>[5]</sup> and 23-67%,<sup>[6]</sup> respectively. These signs not only affect the quality of life but also are the main reasons for adolescents' and teenagers' school absenteeism.<sup>[7]</sup>

The intensity and frequency of menstruation-related signs differ based on menstruation cycle's stages and the cultures, so the lowest prevalence is for Western countries like Yugoslavia.<sup>[5]</sup> Based on World Health Organization (WHO) report, menstruation signs have higher prevalence in Asian countries compared to Western countries.<sup>[8]</sup>

Based on biopsychosocial model, menstruation-related signs are under the influence of not only biological factors such as hormonal disorders and lifestyle (sports and nutrition) but also environmental and social factors like interaction with friends, family, and colleagues and the attitude toward menstruation and psychological factors including anxiety, depression, and stress.<sup>[9,10]</sup> Psychological disorders may activate corticotrophin releasing hormone (CRH) from the nervous system followed by increased cortisol and prolactin which lead to the incidence of menstruation signs.<sup>[11,12]</sup>

In addition to their effect on quality of life, these psychological disorders may lead to suicide, addiction, early sexual experience, adulthood depression, crimes, educational decline, low self-confidence and its consequences, and eventually, occupational, familial, and social dysfunctions.<sup>[13,14]</sup>

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Prevalence of these psychological disorders is rare in the pre-adolescence period and shows no gender-based difference, while in the adolescence period, these disorders increase with a steep slope and are more prevalent among girls who are more vulnerable to various psychosocial factors, so the ratio of girls' involvement in these disorders compared to boys is 1.3:1.<sup>[15]</sup> With regard to previous studies conducted on psychological disorders and menstruation signs, Lonelli (2010) showed a significant association between pre-menstruation signs and stress, anxiety, and depression.<sup>[16]</sup>

Meanwhile, Balaha (2005) reported that about 22% of the students had acute pre-menstruation signs, but there was no significant association between pre-menstruation signs and stress, anxiety, and depression.<sup>[17]</sup> There are controversial studies in this regard as adolescence period (10-19 years) is an important period of human's life. There are also a higher number of adolescents in today's world (21.8% of total population in Iran based on national census of 2006), and major changes occur in appearance, social behavior, and psychological status at puberty.<sup>[18]</sup> With regard to the aforementioned facts and as menstruation signs and psychological disorders including anxiety, depression, and stress vary in different societies and have various prevalence rates in different cultures on the one hand, and since Iran is a country with a young population and such a study had not been already conducted in Mashhad on the other hand, the researcher decided to conduct a study aimed to define the association between menstruation signs and anxiety, depression, and stress among high school girls.

## MATERIALS AND METHODS

This is a cross-sectional study conducted on 407 governmental school girls in the school year 2011. The researcher got research approval from ethical considerations committee of the university and obtained a letter of introduction from Mashhad Nursing and Midwifery School. She delivered the letter to the authorities of schools, and after explaining about the research goals and obtaining students' written informed consent with respect to ethical codes and making the necessary co-ordination concerning the time of questionnaire distribution, she conducted sampling and performed the study. After a pilot study on 10 students, the sample size was calculated as 384 based on correlation index formula:  $n = \frac{(z_1 + z_2)^2(1 - r^2)}{r^2} + 2$ . The total number of subjects was estimated to be 420 with respect to 10% increase as a result of random sampling ( $Z_1 = 1.96$  with regard to confidence coefficient of 95%,  $Z_2 = 84\%$  with regard to test power of 80%, and  $r$  based on the correlation coefficient between menstruation signs and depression, anxiety, and stress estimated as 0.15 in the pilot study).

The method of sampling was such that a high school or vocational school was randomly selected from each of the six educational districts of Khorasan Razavi province using a random number table. Then, with regard to the population of each district, a certain number of students in various courses and grades were selected from the related high school or vocational school. Finally, the expected number of subjects was selected through convenience sampling.

Data collection tool included a questionnaire of demographic and menstruation characteristics, Menstrual Distress Questionnaire (MDQ), and Depression, Anxiety, and Stress Scale (DASS). Rudolf Moos' MDQ (1986) was designed in New York University.<sup>[19]</sup> This questionnaire is scored a four-point Likert scale (no sign = 0, very severe = 4) and contains 16 questions in four dimensions [pain, control, autonomic reactions, and (water) weight gain], and records the menstrual signs a week before menstruation, during bleeding, and a week after menstruation in the recent year. A score of  $\leq 16$  is given for minor menstruation signs,  $17 < \text{score} < 32$  for moderate menstruation signs, and  $33 < \text{score} < 48$  is for acute menstruation signs. Scores over 49 are considered for very acute menstruation signs.<sup>[20]</sup>

*DASS-21*: This questionnaire contains 21 questions measuring depression (7 questions), anxiety (7 questions), and stress (7 questions).

The questions are scored by a four-point Likert scale: "never" (zero) to "very much" (three). The depression-related questions were questions 17, 16, 13, 10, 5, and 3, anxiety-related questions were 20, 19, 15, 9, 7, 4, and 2, and stress-related questions were 18, 14, 12, 11, 8, 6, and 1. A score of 5-6 showed minor depression, 7-10 moderate, 11-13 acute, and over 14 showed very acute depression.

Scores 4-5 were given for minor anxiety, 6-7 moderate, 8-9 acute, and over 10 were given for very acute anxiety. Scores 8-9 were given for minor stress, 10-12 moderate, 13-16 acute, and over 17 for very acute stress. Questionnaires of menstruation distress and scale of depression, anxiety and stress are valid and reliable tools that have been used in the studies of Kordi (2011) and Mollahadi (2010).<sup>[19,21]</sup> Inclusion criteria were giving an informed consent to attend the study, Iranian nationality, residing in Mashhad, being student of grades 1-4 of high school or vocational school, body mass index (BMI)  $< 30$ , and at least 2 years should have passed after the first menstruation. Exclusion criteria were being a professional athlete, experiencing an awful or stressful major event within the recent 6 months of study (death of immediate relatives, acute familial conflicts, financial problems, and a major change in life), taking antipsychotic medication, being on a special diet, being

married, the history of psychiatric diseases during the recent year (a psychotic disease diagnosed by a psychiatrist or taking antipsychotic medications), and presence of any medical disease (diabetes, thyroid disorders, Cushing's disease, hypophysis tumors, reproductive system diseases like myoma, endometriosis, ovarian cysts, pelvic inflammatory diseases). After the researcher referred to research environment and distributed informed consent forms among the students, the goal of study was explained to them. If the subjects agreed to attend and were qualified based on the inclusion and exclusion criteria, the demographic and menstruation questionnaire was given to them to fill up, and then they were asked to complete the MDQ and DASS.

After the data of 407 subjects were collected, they were analyzed by the statistical tests of Student's *t*-test, Mann — Whitney's one-way analysis of variance (ANOVA), chi-square, Pearson correlation coefficient, and linear regression tests through SPSS version 14.

## RESULTS

Based on the findings, the mean (SD) value for age was 16.24 (1.3) years, for BMI was 19.6 (1.6), and for the first menstruation was 12.78 (1.23). A total of 357 (87.7%) subjects were at moderate economic status, 339 (82.2%) were exposed to cigarette smoke, 386 (94.8%) had mothers without university education, and 38 (9.4%) had working mothers.

In addition, 21.4% of subjects had bleeding for more than 7 days, 87% had a period of 21-42 days, and 51% had polymenorrhea. With regard to menstruation signs, 301 (74%) of subjects reported having the signs a week before menstruation, 383 (94.1%) had signs during bleeding, and 166 (4.8%) had them a week after menstruation.

In addition, the mean (SD) scores of pre-menstruation signs, during bleeding, and post-menstruation signs were 20.12 (5.70), 24.86 (7.58), and 17.82 (4.38), respectively.

The intensities of menstruation signs in various stages of menstruation and in various dimensions have been presented in Tables 1 and 2, respectively.

The most common signs were low back pain, early tiredness, and sore muscles pre-menstruation; low back pain, early tiredness, and headaches during bleeding; and low back pain, early tiredness, and dizziness post-menstruation.

The total mean (SD) scores of depression, anxiety, and stress were 7.02 (0.02), 4.4 (0.01), and 5.5 (0.04), respectively.

A total of 186 subjects (45.7%) had no anxiety, 181 (44.5%) were not depressed, and 215 (52.8%) were not stressed [Table 3]. Pearson correlation coefficient showed a positive correlation between the signs a week before, during bleeding, and a week after menstruation and depression, anxiety, and stress [Table 4].

**Table 1: Intensity of menstruation signs during three stages of menstruation**

Intensity of menstruation signs	Pre-menstruation signs n (%)	During bleeding signs n (%)	Post-menstruation signs n (%)
No sign	106 (26.0)	24 (5.9)	241 (59.2)
Minor	298 (71)	330 (81.1)	160 (39.3)
Moderate	10 (2.5)	46 (11.3)	5 (1.2)
Acute	2 (0.5)	7 (1.7)	1 (0.2)
Total	407 (100)	407 (100)	407 (100)

**Table 2: Frequency distribution of subjects based on various dimensions of menstruation signs**

Menstruation phase	Pre-menstruation n (%)	During bleeding n (%)	Post-menstruation n (%)
Menstruation signs dimensions			
Pain	39 (12.95)	320 (83.55)	30 (18.07)
Control	76 (25.24)	40 (10.44)	106 (83.65)
Autonomic reactions	85 (25.23)	10 (2.61)	20 (12.02)
Weight gain (water)	101 (33.55)	13 (3.3)	10 (6.02)
Total	301 (100)	383 (100)	166 (100)

**Table 3: Frequency distribution of subjects based on the intensity of anxiety, depression, and stress**

Intensity of anxiety depression and stress	Anxiety n (%)	Depression n (%)	Stress n (%)
Menstruation signs			
No signs	186 (45.7)	181 (44.5)	215 (52.8)
Minor	76 (18.7)	56 (13.8)	50 (12.3)
Moderate	46 (11.3)	82 (20.1)	53 (13.0)
Acute and very acute	99 (24.3)	88 (21.7)	89 (21.8)
Total	407 (100)	407 (100)	407 (100)

**Table 4: Pearson correction coefficient results based on menstruation signs and depression, anxiety, and stress**

Depression, anxiety, and stress	Pearson correlation coefficient		
Menstruation signs	Depression	Anxiety	Stress
A week before menstruation	$P=0.002$ $r=0.19$	$P=0.001$ $r=0.17$	$P=0.0402$ $r=0.20$
During bleeding	$P=0.001$ $r=0.25$	$P=0.022$ $r=0.23$	$P=0.012$ $r=0.23$
A week after menstruation	$P=0.013$ $r=0.22$	$P=0.001$ $r=0.29$	$P=0.006$ $r=0.19$

It was such that higher intensity of menstruation signs increased the subjects' depression, anxiety, and stress levels. Meanwhile, Pearson correlation test showed no significant association between menstruation bleeding pattern (duration, length of period, and amount of bleeding) and menstruation signs (anxiety, depression, and stress).

Pearson correlation test results showed a positive correlation between the signs and depression, anxiety, and stress scores a week before, during bleeding, and a week after menstruation [Table 3], therefore a higher intensity of menstruation signs and increased depression, anxiety, and stress. In order to control the effective variables, all variables were entered into general linear regression model. It was such that effective variables like menstruation signs and depression, anxiety, and stress including age, BMI, educational level, the age of the first menstruation, exposure to cigarette smoke, mothers' job and education, and economic status were entered as independent variables, and then in the next step, the main variables of the study including menstruation signs, stress, anxiety, and depression were separately entered as dependent variables in several steps. Finally, variables of menstruation signs score, depression, stress, and anxiety had a significance level <0.05 and were considered as predictive variables.

## DISCUSSION

Women form the key foundation of family and society. Family and social health depends on the fulfillment of their health and socio-cultural needs. One of the most critical periods of women's life is adolescence in which menstruation starts. Nowadays, the research on and consideration of menstruation signs are widely spread and organized and are counted as an important research issue. Meanwhile, although menstruation signs are of great importance, they are not yet discussed enough.<sup>[22,23]</sup> The present study showed that a high percentage of the students suffer from psychological disorders despite the menstruation signs in pre-menstruation, during bleeding, and post-menstruation periods. The obtained results also showed a significant association between menstruation signs and anxiety, depression, and stress. With regard to the prevalence of menstruation signs in various parts of the world with different cultures and races, Derman's (2004) study reported the prevalence of pre-menstruation signs as 61.4% among female students in Turkey.<sup>[24]</sup> In addition, Vichin (2006) reported the prevalence of pre-menstruation signs as 59% among 13-18-year-old students in the USA.<sup>[25]</sup> The findings of the present study showed that the highest prevalence of signs was for during bleeding period (94%) and the lowest was for post-menstruation period (40.8%).

Prevalence of menstruation signs a week before menstruation, during bleeding, and a week after menstruation was observed to be higher in the present study compared to other studies conducted. Differences in the cultures, races, religions, and societies can be a reason for the observed difference in prevalence and intensity of menstruation signs. The obtained results also showed that low back pain, early tiredness, and sore muscles were the most prevalent pre-menstruation signs, while low back pain, early tiredness, and headaches were common during bleeding. Also, low back pain, early tiredness, and dizziness were prevalent in the post-menstruation period.

Meanwhile, the most reported menstruation signs among students were abdominal cramps (46.5%), low back pain (28.4%), acne (21.4%), and tender breasts (17.5%) in Lee's (2011) study.<sup>[26]</sup>

Chang *et al.* (2009) reported the most common signs, obtained by retrospective 12-question MDQ, as dysmenorrhea, acne, and tiredness.<sup>[27]</sup> In the study of Chen *et al.* (2005), abdominal cramps, tiredness, low back pain, abdominal bloated feeling, and tender breast were reported as the symptoms.<sup>[28]</sup> Bakhshani (2009) in her study on 18-28-year-old students in Zahedan using a questionnaire with 20 questions reported low back pain, abdominal bloated feeling, and tender breasts as the most prevalent pre-menstruation signs.<sup>[29]</sup> In order for an absolute diagnosis of menstruation signs to be made, especially the pre-menstruation signs. In the present study, menstruation distress signs in pre-menstruation, during bleeding, and post-menstruation periods of the year before were evaluated through retrospective recorded data. Meanwhile, on the contrary, Vichni (2006) studied the signs of the latest menstruation, and Takeda (2010) studied those of the past three cycles.<sup>[25,30]</sup> In addition to aforementioned issues, the obtained findings of the present study showed that 21.7% of the subjects suffered from depression, 24.3% from anxiety, and 21.8% had acute or very acute stress, which shows a higher prevalence of these disorders among the studied group compared to other individuals. Meanwhile, the results of *health and disease project* investigating the mental health among Iranian individuals over 15 years of age reported the prevalence of mental disorders to be 21% in the total population of Iran. Parvaresh (2011) reported a prevalence of mental disorders over 34% among 15-year-old women in Kerman.<sup>[31]</sup> The difference can be as a result of various adopted methods and tools, socio-economic, cultural, and geographic conditions, as well as different age groups. The results of the present study showed a positive correlation between menstruation signs in pre-menstruation, during bleeding, and post menstruation

periods and signs of depression, anxiety, and stress; therefore, an increase in menstruation signs increased the intensity of depression, anxiety, and stress. Ionelli (2010) showed a positive correlation between pre-menstruation signs and depression, anxiety, and stress disorders.<sup>[16]</sup>

Although these results are in line with our obtained results, lower sample size in that study (150 subjects) and investigation of just pre-menstruation signs compared to the higher sample size of the present study and investigation of the signs in three time intervals, namely, pre-menstruation, during bleeding, and post-menstruation reveal the positive points of the present study. In Balaha's cross-sectional study (2005) on 250 medical students in Saudi Arabia, linear regression test showed no significant association between pre-menstruation signs and anxiety, depression, and stress.<sup>[17]</sup> Differences in race, culture, and age of the studied subjects (age 18 years), the sample size [250 subjects compared to our study (407 subjects)], as well as the differences in the adopted questionnaire to record menstruation signs can be among the reasons for the inconsistency observed between these two studies. Despite the researcher assuring the subjects about the confidentiality of their information, in some cases, some information might have not been revealed by them.

Personal, personality, and genetic differences affecting the intensity of menstruation have been relatively controlled by the researcher.

Prospective recording of the data is more precise compared to retrospective recording due to the confounding elements of memory, lack of students' cooperation, and interference of the study with their school assignments, which were among the limitations of the present study; therefore, future studies are suggested to be conducted prospectively.

## CONCLUSION

With regard to high prevalence of low back pain, early tiredness, sore muscles, and dizziness before, during bleeding, and after menstruation, as well as high incidence of depression, anxiety, and stress signs among the students, investigation, prevention, and treatment of these disorders by the authorities in education and training and the Ministry of Health are essential, and educational programs and counseling services should be conducted to tackle these problems.

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