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Original Article

The prevalence of dysmenorrhea and its effects on female university students' quality of life: what can we do in primary care?

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Abstract: This study aimed to estimate the prevalence of dysmenorrhea among Turkish university students studying in the field of health sciences and to evaluate the effects of the students' socio-demographic characteristics on the condition. A cross-sectional survey of 658 students was conducted by questionnaire at a health sciences university in Turkey. A structured questionnaire was used to collect data on dysmenorrhea. Health related quality of life (HRQoL) was assessed using the generic 36-Item Short Form Health Survey (SF-36), and depressive symptoms were assessed with the BDI included in the survey. A visual analogue scale was used to assess the severity of dysmenorrhea. Data were analyzed using chi-square tests and logistic regression analysis. The prevalence of dysmenorrhea was 79.7% (524 out of 658 students). Age of menarche (P = 0.001), menstrual flow (P = 0.000), drinking coffee (P = 0.001) and having a family history of dysmenorrhea were significantly associated with dysmenorrhea in a multivariable analysis. Furthermore, 42.7% of the students with dysmenorrhea missed at least one day of school and 5.3% missed at least one exam. The high prevalence of dysmenorrhea among Turkish university students is a significant health problem requiring attention, and the need for on-the-job training of primary care physicians on the management of primary dysmenorrhea should be considered.

Keywords: Dysmenorrhea, quality of life, SF-36, BDI, depression

Introduction

The medical term "dysmenorrhea" is defined as painful menstruation in the absence of a pelvic pathology [1]. There are two types of dysmenorrhea: "primary" and "secondary". Primary dysmenorrhea involves common menstrual cramps that are recurrent and are not due to other diseases. The pain usually begins 1 or 2 days before, or when menstrual bleeding starts, and is felt in the lower abdomen, back, or thighs. The pain can range from mild to severe, it typically lasts 12 to 72 hours, and many individuals suffer from accompanying nausea and vomiting, fatigue, and even loose, watery stools called diarrhea [2].

Secondary dysmenorrhea is pain that is caused by an underlying disorder such as endometriosis, ovarian cysts, adenomyosis, pelvic inflammatory disease, or pelvic adhesions. So, the clinical onset of secondary dysmenorrhea varies a lot, since the condition may be caused by a number of gynecological pathologies.

Pain from secondary dysmenorrhea usually begins earlier in the menstrual cycle and lasts longer than common menstrual cramps. The pain is not typically accompanied by nausea, vomiting, fatigue, or diarrhea [3]. The burden of dysmenorrhea is greater than any other gynecological complaint [4]. Having cramping during menstruation is one of the most common, annoying parts of a woman's period. The effects extend beyond individual women to society, resulting in an important loss of productivity [5]. The pain experienced by adolescents with dysmenorrhea is the most common gynecological complaint and the leading cause of recurrent school or work absenteeism among adolescents and young adults [6]. In the literature, studies have shown that women with dysmen-

orrhea often fail to go to work or school, resulting in an impaired quality of life. Previous studies on adults report that the absentee rate from school varies between 14% and 51% among women with dysmenorrhea [7]. In another study, the missing class and school absenteeism rates were reported to be 56.3% and 80.0 % during dysmenorrhea periods, respectively [3]. Missing classes was defined as when students miss individual classes because of primary dysmenorrhea and school absenteeism means when students miss a school day due to primary dysmenorrheal pain. Dysmenorrhea constitutes a high health, social, and economic burden with a prevalence ranging from 60% to 93%, depending upon the population and study [8-10].

In modern medicine, patient-reported outcomes are actually considered more valuable than most of the other outcomes. Quality of life (QoL) is one of the most important patient reported outcome measures reported directly by individuals themselves and has been recognized as an important health outcome in the management of chronic conditions which can be used to provide more appropriate and patient-centered care [11]. Quality of life is measured as perceived physical and social functioning, and mental well-being. According to the World Health Organization, QoL is “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns” [12]. Reviews of prior research findings indicate that dysmenorrhea can affect the mental health and social life of an individual such that the QoL may be adversely affected with a lower perception of quality of life among women due to their dysmenorrhea [13].

It is known that there is a close relationship between pain and depression. Recurrent pain in dysmenorrhea-although it is predominantly a somatic symptom-may also have an impairing emotional factor. Persons with a painful experience are most likely to avoid activity leading to disability. Psychological determinants are strongly tied to the depth of the symptoms and the level of disability. The prevalence of headache or fibromyalgic pain is highly associated with depression, and the prevalence of depression is high in patients with chronic pain. Studies suggest a significant association of both conditions [14, 15].

These studies indicate that there is a significant concurrence between dysmenorrhea and depression with an impaired quality of life. However, there are only a few epidemiological studies with adequate sample sizes to analyze the prevalence of depression and the quality of life among adolescents with dysmenorrhea. The extent of comorbid dysmenorrhea and depression and its impacts on the quality of life among Turkish medical, dental, and pharmaceutical students is still unknown.

Therefore, this study aims to analyze the prevalence of depression and dysmenorrhea, its magnitude of association, its determinants and relevant resulting factors affecting the quality of life in university students attending health sciences institutions.

Materials and methods

Subjects

In this cross-sectional study, the data collection, review, and coding were completed during the period May 2017 to June 2017. Female students over 18 years of age were enrolled in the study and were among those attending health sciences faculties at Bezmialem Vakif University, Istanbul, Turkey. The number of the female students studying in those colleges was 702. Six hundred and fifty eight students who agreed to participate in the research were recruited for the study. Of the 702 students, 44 were excluded from the survey due to an unwillingness to participate in the research (n = 10) or not being at classes at the time of the study (n = 34). The remaining 93.7% (658/702) of the women constituted the study group.

All 658 students surveyed at the school completed the questionnaire and inventories during a class period. After distributing the questionnaires to students at the school, they were told how the questionnaires were to be filled in and then were requested to make a choice applicable to themselves. The students completed the questionnaires and inventories in the presence of a member of the research team. The data collected were self-reported by the students. All the subjects (n = 658) were told that participation in the investigation was strictly voluntary,

and that the data collected would not be used for anything except for this research study, and they were given the questionnaires and inventories to complete.

The structured questionnaire consisted of 48 questions and was prepared by the research team for health sciences college students after consulting the literature. It was not an inventory, but it contained various questions on some socio-demographical topics and nutritional information [16, 17]. In the first section of the questionnaire, the students were asked to state their socio-demographic and medical characteristics, and their dysmenorrheal status and habits. The second part of the questionnaire included the visual analogue scale (VAS) questions to assess the severity of dysmenorrhea. The VAS, using a 10-cm line, represented a continuum of each female student's opinion of the degree of pain. One extremity of the line represented 'unbearable pain', and the other extremity represented 'no pain at all'. The participants were asked to rate the degree of pain by making a mark on the line. The scores received from the scale were classified into mild dysmenorrhea if it was from 1-3 points, moderate from 4-7 points, and severe from 8-10 points [4] (**Table 1**).

Their health related quality of life (HRQoL) was assessed using the generic 36-Item Short Form Health Survey (SF-36), and their depressive symptoms were assessed using the BDI included in the survey.

The BDI is a scale which consists of 21 items related to the cognitive and somatic symptoms of depression [18]. Depression was defined as a BDI score ≥ 16. The Turkish version has been validated in Turkey [19]. The overall BDI measure yielded good internal consistency. Cronbach's alpha for this study is 0.80. The SF-36 scale is the most widely used generic instrument for rating HRQoL. It is a self-evaluation instrument consisting of 36 items which provide assessment in eight domains: physical functioning, social functioning, role limitations due to emotional problems (role-emotional), role limitations due to physical problems (role-physical), bodily pain, vitality, mental health, and general health perception. The Turkish version has been validated in Turkey [20]. The subjects gave appropriate answers for the questions in the SF-36 scale for their depression status during the previous 4 weeks. The scores ranged from 0 to 100 for each domain separately. The high scores obtained from the scale show that the HRQoL increases in a positive way.

Following the completion of the questionnaires and inventory, anthropometric assessments (weight, height measurements) were made to determine the participants' BMI. The BMI calculations were determined using the criteria established by the World Health Organization [21].

In addition, smoking habits, and coffee, tea, and alcohol consumption were documented. The presence of dysmenorrhea in an adolescent's mother or sister was accepted as a positive family history of dysmenorrhea.

Statistical analysis

The data obtained in the study were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows version 16 (SPSS, Inc., Chicago, IL, USA). Continuous variables are expressed as the means ± standard deviation (m ± SD) and compared using Spearman's correlation coefficient and chi-square tests. For the categorical variables, the percentages of patients in each category were calculated. t-tests were used to compare the independent groups. A p value smaller than 0.05 ($P < 0.05$) was considered statistically significant.

Results

Comparison of the general information

Of the 702 students selected and invited to participate, 34 students were absent from their class during the study, and 10 students did not accept the invitation to participate, leaving 658 (93.7%) women for the analysis. None of the students was pregnant and all the participants were of the same ethnic and regional origins. The average age of the participants was 20.9 ± 1.8 years (range 17-26 years), and the average age at menarche was 12.88 ± 1.83 years (range 11-16 years). A total of 19.1% (n = 126) of the students indicated that they had a family member with depression. The students' prevalence of dysmenorrhea was found to be 79.7% (n = 524). More detailed socio-demographic characteristics of those with and without dys-

Table 1. Verbal multidimensional scoring system for the assessment of dysmenorrhea severity

Severity grading	Working ability	Systemic symptoms	Analgesics
Grade 0: Menstruation is not painful and daily activity is unaffected	Unaffected	None	None required
Mild (Grade 1): Menstruation is painful but seldom inhibits required normal activity; analgesics are seldom required; mild pain	Rarely affected	None	Rarely
Moderate (Grade 2): Daily activity is affected; analgesics required and give sufficient relief so that absence from school is unusual; moderate pain	Moderately affected	Few	Required
Severe (Grade 3): Activity clearly inhibited; poor effect of analgesics vegetative symptoms (headache, fatigue, vomiting, and diarrhea); severe pain	Clearly inhibited	Apparent	Poor effect

Table 2. Sociodemographic characteristics of the subjects in the study group

Characteristics	Dysmenorrhea			*p* value
	No n [%]	Yes n [%]	Total n [%]	
Faculty				0.234
Medicine	84 [20.3]	329 [79.7]	413 [100.0]	
Dentistry	19 [20.9]	72 [79.1]	91 [100.0]	
Pharmacy	30 [19.5]	124 [70.5]	154 [100.0]	
Age, years				0.66
17-20	96 [42.9]	128 [57.1]	224 [100.0]	
21-23	109 [44.0]	139 [56.0]	248 [100.0]	
24-26	87 [46.8]	99 [53.2]	186 [100.0]	
Family history of dysmenorrhea				0.000
Yes	133 [32.9]	271 [67.1]	404 [100.0]	
No	159 [62.6]	95 [37.4]	254 [100.0]	
Age of menarche, years				0.01
< 12	105 [51.7]	98 [48.3]	203 [100.0]	
13-14	152 [41.4]	215 [58.6]	367 [100.0]	
> 15	35 [39.8]	53 [60.2]	88 [100.0]	

The values are given as a number [percentage]; the percentages are calculated using the row totals.

menorrhea are shown in **Table 2**. The mean BMI of the students was 21.4 ± 2.4 kg/m^2 (range 16.9-32.6). There was no statistically significant difference between dysmenorrhea and the faculty studied, age, BMI, marital status, smoking habit, alcohol consumption, or chronic diseases (P > 0.05). The prevalence of dysmenorrhea was found to be statistically significantly higher in the group with a lower menarche age when the association between dysmenorrhea and the menstruation characteristics were investigated (p: 0.008). In this study, no statistically significant difference was found between time and the frequency and regularity of menstruation and dysmenorrhea (P > 0.05).

Comparison of the menstrual pain scores

It was reported that the participants experienced depressive moods, fatigue, bloatedness, a decrease in daily functions, and an increase in appetite during their menstruation periods. The mean intensity of menstrual pain among the students was 5.56 ± 1.96 on the VAS. A higher prevalence of dysmenorrhea was observed in women who had a family history of dysmenorrhea (P < 0.05). It was found that a total of 34.2% (225) students skipped a class, a total of 44.2% (291) felt the need for analgesics, and a total of 14% (92) sought medical advice due to dysmenorrhea.

Comparison of the scores from the scales

The data yielded from the SF-36s showed a statistically significant difference in the domains of role limitations due to emotional problems (role-emotional), vitality, mental health, social functioning, bodily pain, and general health perception among the study group. The average scores the subjects received from the SF-36 domains by status of dysmenorrhea are shown in **Table 4**. The scores gathered showed that 175 (26.6%) of the participants suffered from depression according to the BDI scores.

Comparison of habits

In the study group, the prevalence of smoking cigarettes was 13.8% (n = 91) and of alcohol consumption was 25.5% (n = 168). The number of students who drank four or more cups of tea a day was 119 (18.1%). Nearly all of the students (98.9%) reported that they consumed at least three cups of coffee a day. Of the study group, 63 students (9.6%) reported having a chronic disease necessitating continuous medicine use. There was no statistically significant difference between habits and the medical characteristics of the students by status of dysmenorrhea, except for coffee consumption (P < 0.001). More detailed data on the habits and medical characteristics of the students by status of dysmenorrhea are given in **Table 3**.

Table 3. The significant independent variables for dysmenorrhea according to a logistic regression analysis

Variables	β	SE	p	OR	95% CI
Constant	0.202	0.137	0.411		
Family history [reference: no] Yes	1.113	0.200	0.000	3.043	2.058-4.500
Coffee consumption [reference: no] Yes	0.734	0.224	0.001	2.084	1.342-3.235

Hosmer and Lemeshow test: chi-square = 3.616; P = 0.606.

Table 4. The average scores subjects received from the SF-36 domains by status of dysmenorrhea

Domains	Yes [n = 478] [mean ± SD]	No [n = 180] [mean ± SD]	t value/ *p*-value
Physical functioning	54.77 ± 43.65	58.20 ± 41.74	1.524/0.115
Role-physical	58.46 ± 14.73	60.03 ± 15.06	1.010/0.376
Bodily pain	61.01 ± 17.75	68.21 ± 21.44	5.955/0.000
General health perception	55.12 ± 16.88	60.95 ± 17.77	2.675/0.004
Vitality	53.46 ± 15.15	56.47 ± 15.38	2.567/0.012
Social functioning	67.39 ± 19.42	72.87 ± 20.07	1.717/0.014
Role-emotional	80.33 ± 16.58	84.97 ± 16.99	2.225/0.034
Mental health	76.37 ± 28.66	84.91 ± 28.57	2.590/0.013

Discussion

The present study found a high prevalence of dysmenorrhea (79.7%) reported among university students; this figure is in line with previous studies reporting rates between 28% and 89.5% (22-24). Previous studies investigating prevalence of dysmenorrhea conducted in Turkey concluded that the prevalence of dysmenorrhea among the same age group of women ranged from 23.4% to 85.7% (16, 25, 26). A reason for the variation in these estimates may be the use of selected groups of women, the absence of a universally accepted method of defining dysmenorrhea, and the ethnic and sociocultural factors among the study groups [27].

In the present study, nearly four-fifths of the subjects described their dysmenorrhea as severe (45.7%) and moderate (34%), in accordance with a study in the literature [28]. This indicates that dysmenorrhea is still an important public health problem and that these female students experience severe or moderate dysmenorrhea, which may have a negative effect on quality of life, school success, social environment, and psychological status. Dysmenorrhea was associated with nausea in 58%, with vomiting in 19%, with fatigue in 77.4% and with distressed moods in 79.7%, in line with a study in the literature [29].

In many studies, it was determined that a decrease was demonstrated in the prevalence of dysmenorrhea with increasing age, indicating that primary dysmenorrhea peaks in late adolescence and the early 20s, and the incidence declines with increasing age [30, 31]. However, there was no statistically significant difference found between individual age groups and the prevalence of dysmenorrhea in this study (P > 0.05). This is probably because the students in the study group were relatively younger subjects.

In epidemiological studies [32], correlations have been found between dysmenorrhea and several environmental factors, including current cigarette smoking. However, this study did not find any relationship between cigarette use and dysmenorrhea not in line with any other study (P > 0.05) [33]. This may be due to the fact that the majority of the participants were non-smokers (88.3%).

The prevalence of dysmenorrhea was lower among women who had lower intakes of caffeine, leading to the conclusion that coffee consumption is an important risk factor for dysmenorrhea, in line with some researchers' studies [34]. Some researchers have suggested that caffeine, which is the main ingredient of coffee, is an adenosine analogue that inhibits adenosine (a potent vasodilator) receptors [35]. Blocking these receptors causes vasoconstriction that will decrease the blood flow to the uterus, which is common in women with dysmenorrhea, causing a further increase in the degree of menstrual pain.

Dysmenorrhea can be a major cause of school absenteeism and missing exams. In our study, 42.7% of the students with dysmenorrhea missed at least one school day during the previous academic year. Also, 5.3% of the participants with dysmenorrhea missed at least one exam in the previous academic year. Our findings were in accordance with other studies done both in Turkey and in other countries [36, 37].

We also found that the amount of blood lost during a menstrual period (menstrual flow) was significantly associated with dysmenorrhea. This finding is compatible with several studies, showing that the risk of dysmenorrhea is higher in women with heavy menstrual flows [36, 38]. It is thought that both the flow of menstruation and dysmenorrhea are determined by prostaglandins. In the case of increased blood flow, prostaglandins can disturb the homeostatic mechanism of the endometrium, hence increasing the blood flow. Moreover, platelet aggregation and/or various coagulation factors are affected by prostaglandins, leading to an increase in menstrual blood flow [39].

Similar to other studies, no significant association was found between physical activity and dysmenorrhea in this study [40, 41]. The lack of an association between physical activity and dysmenorrhea may indicate that women with heavy blood flow may avoid exercise and other physical activities due to the risk of developing iron deficiency anemia because of increased menstrual blood flow [42]. In addition to the studies that showed no association between dysmenorrhea and physical activity, one study in the literature reported that physical activity is positively associated with dysmenorrhea [43]. However, prospective studies are better at addressing this question and other questions related to dysmenorrhea risk factors.

According to the bivariate and multivariate analyses, our study showed that the those having a family history of dysmenorrhea have a significantly higher prevalence of dysmenorrhea, a finding which is consistent with some studies [44, 45]. This result indicates that a family history of dysmenorrhea seems to be an important characteristic for women with dysmenorrhea. Some researchers have suggested that daughters of mothers who have menstrual complaints also experience menstrual discomfort, and that the reason for this could be related to behavior that is learned from the mother [46, 47]. In our study, more than 80% of the students with dysmenorrhea reported having a first-degree family member suffering from pain and discomfort during menses. In future studies, it would be interesting to make the distinction between having an affected mother and/or sisters and the mother's education as a predictive factor for a daughter's behavior regarding menstrual pain, as suggested by other authors [48].

The mean score for the intensity of pain according to the VAS was 5.56 ± 1.96. Some researchers have found similar results [49], but other researchers have determined different scores [50]. One possible explanation for this is that the perception of pain could vary due to societal, lifestyle, or cultural factors.

In this study, the scores yielded from many of the SF-36 domains such as role limitations due to emotional problems (role-emotional), vitality, mental health, social functioning, bodily pain, and general health perception were significantly lower in the students with dysmenorrhea.

An explanation for why those parameters are affected could be that since dysmenorrhea is a disturbing condition that both affects physical health and mental health, the domains of the SF-36 related to both were affected. In addition, with the increasing severity of dysmenorrhea, the average scores received from all the domains of SF-36 showed decreases, consistent with a study in the literature indicating that women with dysmenorrhea have lower HRQoL values [51]. The prevalence of dysmenorrhea among female students was relatively high throughout our study, reaching nearly four-fifths (79.7%), and the HRQoL showed a decrease in the presence of dysmenorrhea and with an increase in the severity of dysmenorrhea.

It was determined that compared to other studies done among the rest of the community [52], the depression levels were higher and the quality of life was impaired in adolescents with dysmenorrhea consistent with previous studies [53]. In addition, it was shown that the depression levels increased, and the psychosocial health subscale scores of quality of life decreased with increasing dysmenorrhea severity.

Dysmenorrhea seems to be highly prevalent among female university students in Turkey. A substantial number of those with dysmenorrhea sought medical advice and also missed school days and school exams. Univariable and multivariable analyses have shown that age of menarche, menstrual flow, and coffee drinking are significant independent predictors for dysmenorrhea. Our data suggest dysmenorrhea is a major public health problem among female university students and causes a social burden on students in addition to affecting school attendance, demonstrating that the condition is a significant public health problem requiring attention. Training primary care physicians on the management of primary dysmenorrhea should be considered.

In addition, primary dysmenorrhea is strongly linked with positive scores for depression, with participants expressing distressed moods. Because of this association, attention should be given to effective mental health screening among these subjects, and psychological support may be necessary during their treatment and follow-up in primary care.

Disclosure of conflict of interest

None.

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