

The impact of primary dysmenorrhea on the adolescents` activities and school attendance

Ainur Donayeva

West Kazakhstan Marat Ospanov State Medical University

Ainur Amanzholkyzy

West Kazakhstan Marat Ospanov State Medical University

Roza Nurgaliyeva

West Kazakhstan Marat Ospanov State Medical University

Gulnara Gubasheva

West Kazakhstan Marat Ospanov State Medical University

Samat Saparbayev

West Kazakhstan Marat Ospanov State Medical University

Dinmukhamed Ayaganov

West Kazakhstan Marat Ospanov State Medical University

Aiman Kaldybayeva

West Kazakhstan Marat Ospanov State Medical University

Ibrahim A. Abdelazim

Ain Shams University

Ihab I. Samaha (✉ dr.ihabsamaha@gmail.com)

Helwan University

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Abstract

Background: The primary dysmenorrhea is the most prevalent menstrual problem in adolescence, which affects their daily activities, and it is the most common cause of adolescents' school absenteeism.

Objectives: To detect the impact of primary dysmenorrhea on the adolescents' activities, and school attendance.

Methods: One hundred and eighty (180) adolescents between 12-18 years-old with primary dysmenorrhea were included in this study. After thorough evaluation, a trans-abdominal pelvic ultrasound was done for the studied participants to exclude any pelvic pathology.

The severity of the participants' dysmenorrhea was assessed using the visual analogue scale (VAS). Participants were categorized based on the VAS into, mild dysmenorrhea (VAS 1-3), moderate dysmenorrhea (VAS 4-7), and severe dysmenorrhea (8-10) groups. Participants were asked whether the dysmenorrhea based on its severity (i.e., mild (VAS 1-3), moderate (VAS 4-7), or severe (VAS 8-10)), negatively affect their physical, and social activities, or their school attendance or not. The one-way ANOVA test was used to compare between the studied groups. The Pearson's correlation was used to detect the relation between the severity of dysmenorrhea, and its negative impact on the adolescents' activities, and school attendance.

Results: There was a significant positive correlation between the severity of dysmenorrhea, and its negative impact on the adolescents' physical activities ($r = 0.395$; $P < 0.00001$), and between the severity of dysmenorrhea, and its negative impact on the adolescents' social activities ($r = 0.658$; $P < 0.00001$). There was also a significant positive correlation between the severity dysmenorrhea and its negative impact on the adolescents' school attendance ($r = 0.416$; $P < 0.00001$).

Conclusion: The odds of negative impact of dysmenorrhea on the adolescents' physical, and social activities, and on their school, attendance were significantly higher in adolescents suffering from moderate, and severe dysmenorrhea compared to adolescents with mild dysmenorrhea.

Background

Primary dysmenorrhea is defined as painful, lower abdominal cramps, occurs just before the menstruation, and lasts for 8–72 hours after, without any pelvic pathology [1].

The primary dysmenorrhea usually starts with the menarche or 6–24 months after the menarche. The primary dysmenorrhea may be associated with systemic symptoms as headache, fatigue, vomiting, and diarrhea [2]. The primary dysmenorrhea affects 16–91% of reproductive-age women [3].

Increased local prostaglandins with a subsequent increased amplitude of uterine contractions, and endometrial ischemia is the most accepted theory of primary dysmenorrhea [4–6].

The primary dysmenorrhea is the most prevalent menstrual problem in adolescence, which affects their daily activities, and it is the most common cause of adolescents' school absenteeism [7].

Dysmenorrhea is a public health problem, which negatively affect the quality of life, and work productivity [8].

The younger generation's quality of life, prevention, and treatment of diseases at early stages is an important priority of the health care program of the Republic of Kazakhstan for the years 2020–2025 [9]. Therefore, this study was aimed to detect the impact of primary dysmenorrhea on the adolescents' activities, and school attendance.

Methods

One hundred and eighty (180) adolescents between 12–18 years-old with primary dysmenorrhea were included in this cross-sectional study to detect the impact of primary dysmenorrhea on the adolescents' activities, and school attendance.

Participants were recruited for this cross-sectional study from 43 schools of West Kazakhstan (Aktobe) over two years (2021 and 2022), after approval of the ethical committee of West Kazakhstan Medical University (WKMU), (Meeting No. 10 dated 04.10.2020).

Participants were included in this study after informed consent (from participants and their parents or their guardians) following the Helsinki Declaration.

Participants were evaluated thoroughly and examined at the Diagnostic Health Center by an adolescent gynecologist according to the West Kazakhstan hospital's protocol.

After a thorough history, and anthropometric evaluation [(i.e., weight, height, and body mass index (BMI)), a trans-abdominal pelvic ultrasound was done for the studied participants to exclude any pelvic pathology.

The trans-abdominal pelvic ultrasound was done by an expert sonographer blinded to the participants' clinical data using the trans-abdominal convex probe of the Samsung HS40 (Samsung Co., Korea) machine.

Participants between 12–18 years old, normal BMI (> 18.5 – 24.9 Kg/m²), with regular menstrual cycle (every 21–35 days), and primary dysmenorrhea [visual analogue scale (VAS) ≥ 1] for \geq one year duration since their menarche were included in this cross-sectional study.

Participants < 12 or > 18 years-old, BMI \leq 18.5 (underweight), BMI > 24.9 Kg/m² (overweight), with pelvic organs anomalies (i.e., including anomalies of the genital and/or urinary tracts) or pelvic pathology (i.e., fibroid uterus and/or ovarian cyst or mass), previous pelvic surgery, neurological or psychiatric disorders, or received exogenous hormonal therapy within the last year were excluded from this study.

The BMI calculated from the studied adolescents' body weight and their height (kg/m²). The WHO considered < 18.5 kg/m² underweight, > 18.5–24.9 kg/m² normal-weight, 25–29.9 kg/m² overweight, and > 30 Kg/m² obesity class-I [10, 11].

The visual analogue scale (VAS) was used to assess the severity of dysmenorrhea (0 is the lowest VAS, and means no pain, while 10 is the highest VAS, and means unbearable pain) [12].

Participants were categorized based on the VAS into; mild dysmenorrhea (VAS 1–3), moderate dysmenorrhea (VAS 4–7), and severe dysmenorrhea (8–10) groups [13].

Participants were asked whether the dysmenorrhea based on its severity (i.e., mild (VAS 1–3), moderate (VAS 4–7), or severe (VAS 8–10)), negatively affect their physical, and social activities, or their school attendance or not [14]. Collected data were analyzed to detect the impact of primary dysmenorrhea on the adolescents' activities and school attendance.

Sample Size

The required sample required for this study was calculated based on the total number of adolescents between 12–18 years old in West Kazakhstan (27,972), the prevalence of dysmenorrhea among adolescents (8–83%) and using the G Power (version 3.1.9.7) for sample size (Düsseldorf; Germany), setting the probability at 0.05, power at 0.95%, sample size at 0.25, and ANOVA test for statistical analysis. Consequently, an effective sample size \geq 150 in 3 groups was needed to produce an acceptable figure.

Statistical analysis

The SPSS (Statistical Package for Social Sciences) version 25 (Chicago, IL, USA) was used for analysis of collected data. The mean, and standard deviation (\pm SD) were used to present numerical values, while the number (n), and percentage (%) were used to present categorical values.

The one-way ANOVA test with the post-hoc Turkey HSD was used to compare between the studied groups. The Pearson *sc* or *relation(r)* was used \rightarrow *det ect the relation between the severity of dysmen or rhea, and its \rightarrow ative impact of the ado \leq scents' acti* activities, and school attendance. $P < 0.05$ considered significant.

Results

One hundred and eighty (180) adolescents between 12–18 years-old with primary dysmenorrhea were included in this study and categorized based on the VAS into; mild dysmenorrhea (VAS 1–3), moderate dysmenorrhea (VAS 4–7), and severe dysmenorrhea (8–10) groups to detect the impact of primary dysmenorrhea on the adolescents' activities, and school attendance.

There was no difference between the 3 studied groups regarding the mean age, and height (14.8 ± 1.4 years, and 157.7 ± 1.6 cm, respectively for the mild dysmenorrhea group, 14.8 ± 1.6 years, and 157.6 ± 2.2 cm, respectively for the moderate dysmenorrhea group, and 15.3 ± 1.5 years, and 158.0 ± 1.4 cm, respectively for the severe dysmenorrhea group), (Table 1).

Table 1
One ANOVA analysis of the studied groups characteristics

Variables	N	Mean ± SD	SS	DF	MS	F	$Q_{.05} = 3.3426$ & $Q_{.01} = 4.1740$ (P-value)
Age (Years)	60	14.8 ± 1.4	11.025	2	5.5125	2.55682	G1:G2; Q = 0.0 (P = 0.0)
- Mild dysmenorrhea group	60	14.8 ± 1.6					G1:G3; Q = 2.77 (P = 0.13)
- Moderate dysmenorrhea group	60	15.3 ± 1.5					G2:G3; Q = 2.77 (P = 0.13)
- Severe dysmenorrhea group							
Height (Cm)	60	157.7 ± 1.6	5.0333	2	2.5167	0.82565	G1:G2; Q = 0.3 (P = 0.98)
- Mild dysmenorrhea group	60	157.6 ± 2.2					G1:G3; Q = 1.4 (P = 0.58)
- Moderate dysmenorrhea group	60	158.0 ± 1.4					G2:G3; Q = 1.7 (P = 0.45)
- Severe dysmenorrhea group							
Weight (Kg)	60	58.7 ± 2.1	22.536	2	11.2681	2.03485	G1:G2; Q = 2.22 (P = 0.26)
- Mild dysmenorrhea group	60	58.0 ± 2.8					G1:G3; Q = 0.44 (P = 0.95)
- Moderate dysmenorrhea group	60	58.8 ± 2.1					G2:G3; Q = 2.66 (P = 0.15)
- Severe dysmenorrhea group							
BMI (Kg/m²)	60	23.6 ± 0.7	2.6888	2	1.3444	2.2044	G1:G2; Q = 2.6 (P = 0.16)
- Mild dysmenorrhea group	60	23.3 ± 0.9					G1:G3; Q = 0.08 (P = 0.99)
- Moderate dysmenorrhea group	60	23.6 ± 0.7					G2:G3; Q = 2.5 (P = 0.18)
- Severe dysmenorrhea group							
VAS	60	1.72 ± 0.7	1566.21	2	783.106	1347.033	G1:G2; Q = 33.5 (P = 0.000001*)
- Mild dysmenorrhea group	60	5.02 ± 0.9					G1:G3; Q = 73.3 (P = 0.000001*)
- Moderate dysmenorrhea group	60	8.9 ± 0.7					G2:G3; Q = 39.8 (P = 0.000001*)
- Severe dysmenorrhea group							
*: Significant difference. BMI: Body mass index. Data presented as mean ± SD (Standard Deviation).							
DF: Difference of freedom between groups. F: Statistical test of ANOVA analysis (ANOVA coefficient).							
MS: Mean of squares between groups. N: Number. One way ANOVA test used for analysis of variance between the studied groups.							
SD: Standard deviation. Significant value < 0.05 according to post-hoc Turkey HSD ($HSD_{.05} = 0.3290$ and $HSD_{.01} = 0.4109$).							
SS: Sum of squares between groups. VAS: Visual Analogue Scale.							

There was also no difference between the 3 studied groups regarding their weight, and BMI (58.7 ± 2.1 kg, and 23.6 ± 0.7 Kg/m², respectively for the mild dysmenorrhea group, 58.0 ± 2.8 Kg, and 23.3 ± 0.9 Kg/m², respectively for the moderate dysmenorrhea group, and 58.8 ± 2.1 Kg, and 23.6 ± 0.7 Kg/m², respectively for the severe dysmenorrhea group), (Table 1).

The categorization of the studied participants based on the VAS into; mild dysmenorrhea (VAS 1–3), moderate dysmenorrhea (VAS 4–7), and severe dysmenorrhea (8–10) groups, explains the significant difference between the 3 studied groups regarding their VAS (1.72 ± 0.7 for the mild dysmenorrhea group, 5.02 ± 0.9 for the moderate dysmenorrhea group, and 8.9 ± 0.7 for the severe dysmenorrhea group), (Table 1).

The correlation analysis showed a significant positive correlation between the severity of dysmenorrhea, and its negative impact on the adolescents' physical activities ($r = 0.395$; $P < 0.00001$), (Fig. 1), and between the severity of dysmenorrhea, and its negative impact on the adolescents' social activities ($r = 0.658$; $P < 0.00001$), (Fig. 2). The correlation analysis also showed a significant positive correlation between the severity dysmenorrhea, and its negative impact on the adolescents' school attendance ($r = 0.416$; $P < 0.00001$), (Fig. 3).

The odds of negative impact of dysmenorrhea on the adolescents' physical, and social activities and on their school attendance were significantly higher in moderate dysmenorrhea group (OR 3.27; $P = 0.02$, OR 3.51; $P = 0.01$, and OR 3.51; $P = 0.01$, respectively) compared to mild dysmenorrhea group (Table 2).

Table 2

The odds of negative impact of moderate dysmenorrhea on the studied adolescents' activities, and school attendance

Variable	Mild Dysmenorrhea group (N = 60)	Moderate Dysmenorrhea group (N = 60)	OR [<i>P</i> -value (95%CI)]
Physical Activities	6	16	3.27 (0.02* (1.18–9.07))
- Negative effect of dysmenorrhea	54	44	
- Not affected by dysmenorrhea			
Social Activities	7	19	3.51 (0.01* (1.35–9.14))
- Negative effect of dysmenorrhea	53	41	
- Not affected by dysmenorrhea			
School Attendance	7	19	3.51 (0.01* (1.35–9.14))
- Negative effect of dysmenorrhea	53	41	
- Not affected by dysmenorrhea			
CI: Confidence interval. N: Number. OR: Odd ratio			

The odds of negative impact of dysmenorrhea on the adolescents' physical, and social activities and on their school attendance were also significantly higher in severe dysmenorrhea (OR 5.6; $P=0.0007$, OR 19.2; $P<0.0001$, and OR 6.2; $P=0.0001$, respectively) compared to mild dysmenorrhea group (Table 3).

Table 3

The odds of negative impact of severe dysmenorrhea on the studied adolescents' activities, and school attendance

Variable	Mild Dysmenorrhea group (N = 60)	Severe Dysmenorrhea group (N = 60)	OR [<i>P</i> -value (95%CI)]
Physical Activities	6	23	5.6 (0.0007* (2.1–15.1))
- Negative effect of dysmenorrhea	54	37	
- Not affected by dysmenorrhea			
Social Activities	7	43	19.2 (<0.0001* (7.28–50.41))
- Negative effect of dysmenorrhea	53	17	
- Not affected by dysmenorrhea			
School Attendance	7	27	6.2 (0.0001* (2.4–15.83))
- Negative effect of dysmenorrhea	53	33	
- Not affected by dysmenorrhea			
CI: Confidence interval. N: Number. OR: Odd ratio			

Discussion

The primary dysmenorrhea is the most prevalent menstrual problem in adolescence, which affects their daily activities, and it is the most common cause of adolescents' school absenteeism [7].

The younger generation's quality of life, prevention, and treatment of diseases at early stages is an important priority of the health care program of the Republic of Kazakhstan for the years 2020–2025 [8]. Therefore, one hundred and eighty (180) adolescents between 12–18 years-old with primary dysmenorrhea were included in this study, and categorized based on the VAS into, mild dysmenorrhea (VAS 1–3), moderate dysmenorrhea (VAS 4–7), and severe dysmenorrhea (8–10) groups to detect the impact of primary dysmenorrhea on the adolescents' activities, and school attendance.

In this study, there was a significant positive correlation between the severity of dysmenorrhea, and its negative impact on the adolescents' physical activities ($P<0.00001$), and between the severity of dysmenorrhea, and its negative impact on the adolescents' social activities ($P<0.00001$). This study also found a significant positive correlation between the severity dysmenorrhea, and its negative impact on the adolescents' school attendance ($P<0.00001$).

The odds of negative impact of dysmenorrhea on the adolescents' physical, and social activities and on their school attendance were significantly higher in adolescents suffering from moderate, and severe dysmenorrhea compared to adolescents with mild dysmenorrhea.

EL-kosery in a correlational study found 60.4% of the students were usually absent from the class during their dysmenorrhea which in turn negatively affect their school performance [1].

A cross-sectional study conducted in one of public universities of Ethiopia, found the dysmenorrhea had significant negative impact on the students' class attendance, academic performance, and concentration during the academic examinations [15]. The same study concluded that the educational performance

of students with dysmenorrhea was > 8 times negative affected compared to students without dysmenorrhea [15].

Rafique and Al-Sheikh, in a cross-sectional study found 8.7% of the participants were absent from their academic university classes due to dysmenorrhea, and 54.5% of the participants reported negative effect of dysmenorrhea on their educational performance, and daily activities [6].

Gebeyehu et al, in another cross-sectional study found 63% of the participants had social withdrawal, 51.4% had decreased academic performance, 40.9% experienced restrictions from daily physical activities, and 31.1% were absent from the academic classes during the dysmenorrhea [7]. *Gebeyehu et al*, also found 63.8% of the participants were using home remedies as a primary management for their dysmenorrhea, and the nonsteroidal anti-inflammatory drugs (NSAIDs) were the most used pain relief medications during dysmenorrhea [7].

The NSAIDs are usually associated with risks of gastric ulcers and gastrointestinal bleeding [16, 17]. Therefore, the relief of dysmenorrhea with other therapeutic options could be helpful and limit the use of NSAIDs.

An observational study found the severity of dysmenorrhea, increased in women with low serum vitamin D levels [18].

A randomized controlled study found the serum vitamin D was significantly lower in dysmenorrhea, with a significant negative correlation between the severity of dysmenorrhea, and serum vitamin D [19].

A randomized comparative study reported significant reduction in the severity of dysmenorrhea, and use of NSAID after a single oral dose of cholecalciferol (300.000 IU) compared with the placebo [20].

Another randomized controlled trial found that participants received vitamin D experienced significant reduction in menstrual pain, and the consumed pain-relief medications [4].

Bahrami et al, found the high vitamin D supplementation (50.000 IU cholecalciferol/week) for 9 weeks reduces the severity of dysmenorrhea [21].

A systematic review reported an inverse relation between serum vitamin D/calcium, and severity of dysmenorrhea, and reduced severity of dysmenorrhea after vitamin D/calcium intake [22].

Hong et al, reported higher odds of dysmenorrhea in underweight and obese women [23]. *Jiang et al*, also reported higher odds of dysmenorrhea in women with lower or higher BMI compared to normal BMI controls [24].

Moreover, *Kaur et al*, reported a significant relation between severe dysmenorrhea, and BMI especially (underweight and overweight adolescents) [25].

This study is the first study conducted in Aktobe-West Kazakhstan to detect the impact of primary dysmenorrhea on the adolescents' activities, and school attendance, following the health care program of the Republic of Kazakhstan for the years 2020–2025.

In this study, there was a significant positive correlation between the severity of dysmenorrhea, and its negative impact on the adolescents' physical activities, and between the severity of dysmenorrhea and its negative impact on the adolescents' social activities. This study also found a significant positive correlation between the severity dysmenorrhea, and its negative impact on the adolescents' school attendance. The odds of negative impact of dysmenorrhea on the adolescents' physical, and social activities and on their school attendance were significantly higher in adolescents suffering from moderate, and severe dysmenorrhea compared to adolescents with mild dysmenorrhea. Adolescents refused to participate was the only limitations of this study.

This study suggests a national health education program aimed; 1) to increase the awareness of the schools, and universities authorities regarding the negative impact of dysmenorrhea on the adolescents' academic performance. 2) to increase the support of the school, and university authorities for their adolescents' suffering from dysmenorrhea. 3) to increase the awareness of the adolescents, and their families regarding the benefits of maintaining ideal BMI, and normal serum vitamin D.

Conclusion

In this study, there was a significant positive correlation between the severity of dysmenorrhea, and its negative impact on the adolescents' physical and social activities. There was also a significant positive correlation between the severity dysmenorrhea, and its negative impact on the adolescents' school attendance. The odds of negative impact of dysmenorrhea on the adolescents' physical, and social activities, and on their school, attendance were significantly higher in adolescents suffering from moderate, and severe dysmenorrhea compared to adolescents with mild dysmenorrhea.

Abbreviations

BMI
Body mass index.
NSAIDs
Non-steroidal anti-inflammatory drugs.
SD
Standard deviation.
VAS
Visual analogue scale.

Declarations

Ethical considerations

1. Ethics approval and consent to participate: Participants were included in this study after approval of the institute ethical committee of West Kazakhstan Medical University Meeting No. 10 dated 04.10.2020. Adolescents were included in this study after informed consent from the adolescents themselves, and their parents or legal guardian following the Helsinki Declaration. All experiments done in this study were performed in accordance with the Declaration of Helsinki.

2. Consent for publication: Not applicable

3. Availability of data and materials: The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

4. Competing interests: Authors declare no conflict of interests related to this study.

5. Funding: Not applicable

6. Authors' contribution

AD designed the study, participants' evaluation (i.e., including history, anthropometric evaluation, and examination), collected the participants' data, and revised the manuscript before submission.

AA designed the study, participants' evaluation (i.e., including history, anthropometric evaluation, and examination), collected the participants' data, and revised the manuscript before submission.

RN explaining and educating the participants and their parents, collected, and analyzed the participants' data, and revised the manuscript before submission.

GG reviewed the literature, updated the references, edited, and statistically analyzed the participants' data, and revised the manuscript before publication.

SS explaining and educating the participants and their parents, collected, and analyzed the participants' data, and revised the manuscript before submission.

DA reviewed the literature, updated the references, edited, and statistically analyzed the participants' data, and revised the manuscript before publication.

AK designed the study, participants' evaluation (i.e., including history, anthropometric evaluation, and examination), collected the participants' data, and revised the manuscript before submission.

IAA reviewed the literature, updated the references, edited, and statistically analyzed the participants' data, and revised the manuscript before publication.

IIS reviewed the literature, updated the references, edited, and statistically analyzed the participants' data, and revised the manuscript before publication.

All authors read and approved the final manuscript.

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Figures

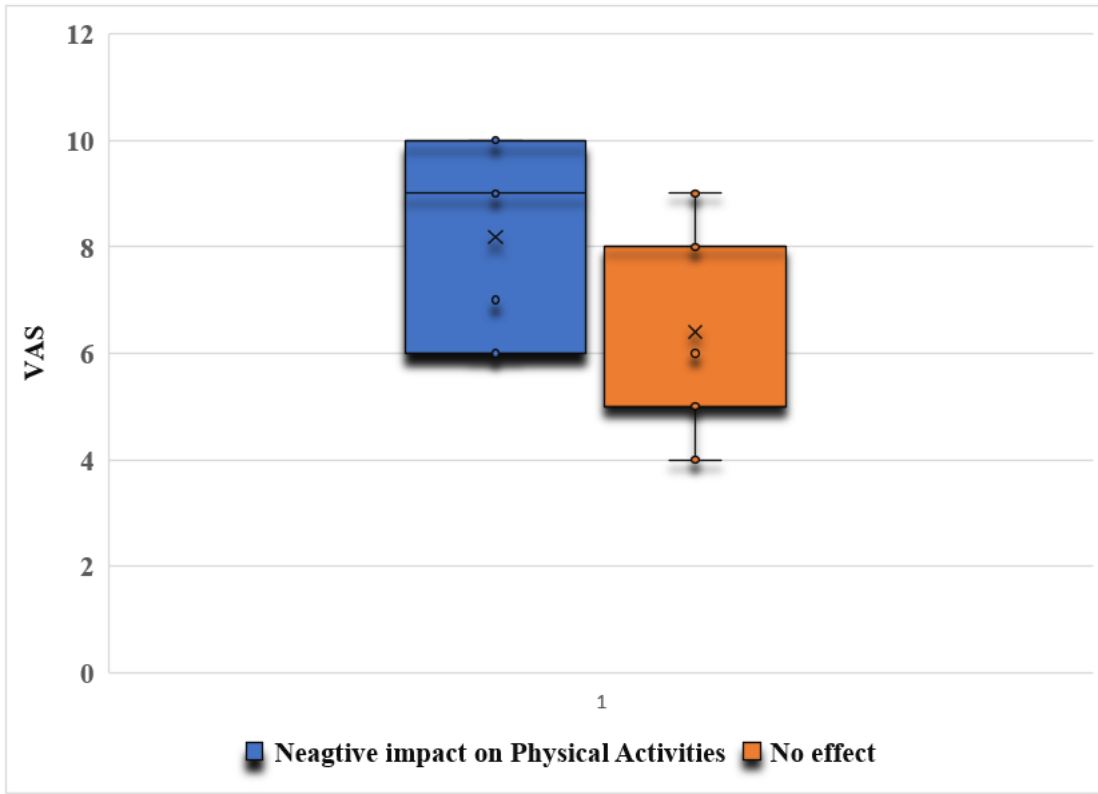


Figure 1

The impact of dysmenorrhea on the adolescents' physical activities

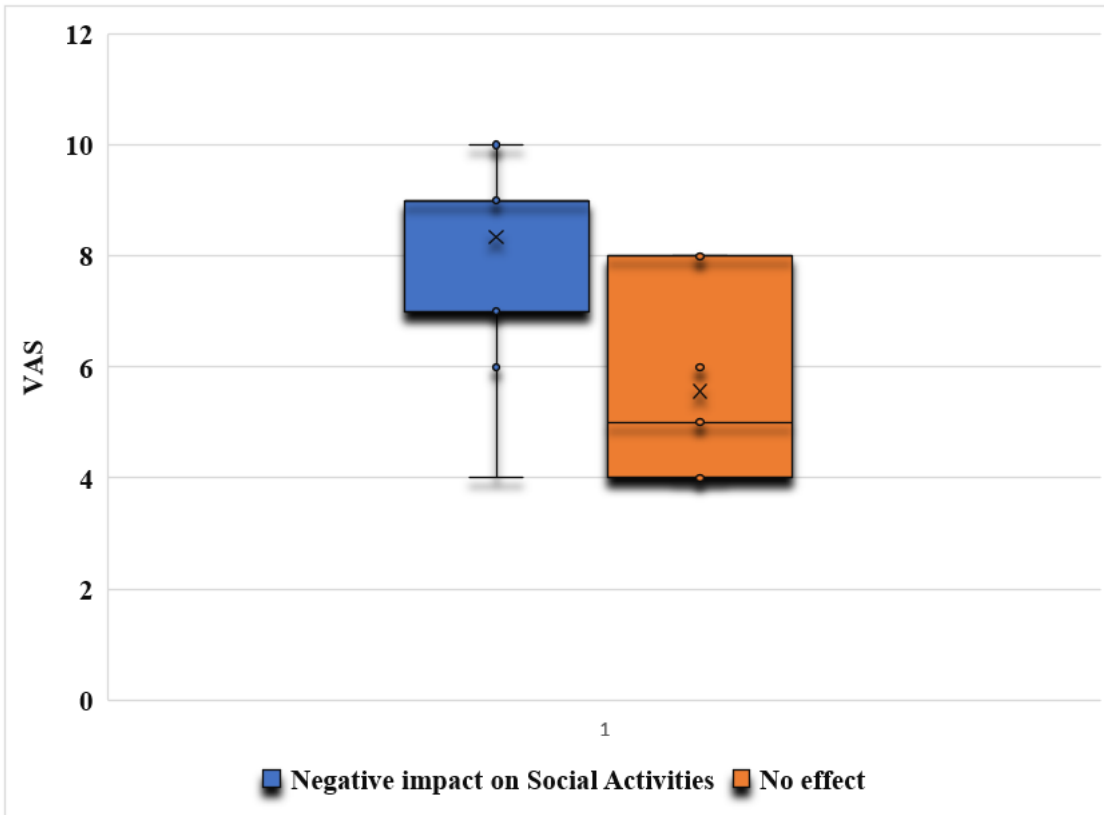


Figure 2

The impact of dysmenorrhea on the adolescents' social activities

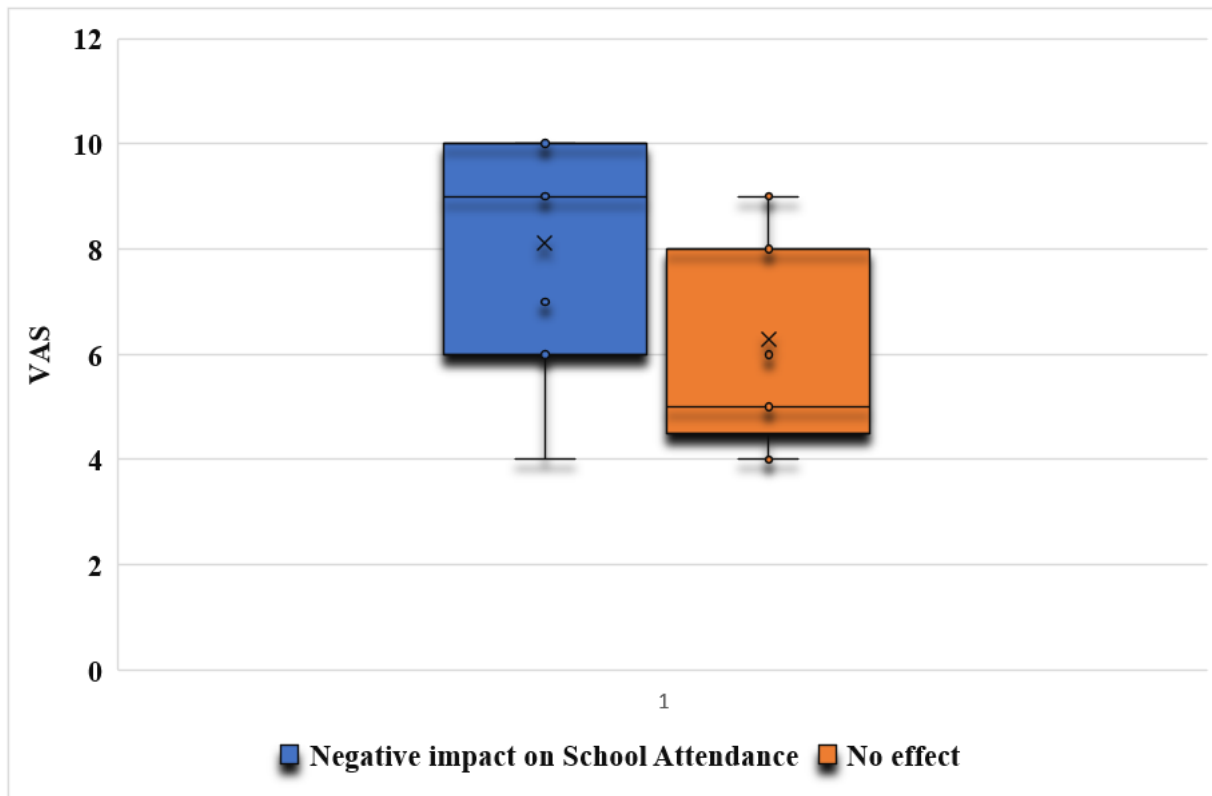


Figure 3

The impact of dysmenorrhea on the adolescents' school attendance