



Association of Psychological Distress with Primary Dysmenorrhea among Adolescents Living in West Bengal, India

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Primary dysmenorrhea, a painful uterine cramp without any pelvic pathology that occur before or during menstruation among reproductive women.

Objective: The objective of this study was to compare the psychological distress between adolescent female students with dysmenorrhea and without dysmenorrhea and also to examine relationship between psychological distress and dysmenorrhea.

Methods: This is a cross sectional questionnaire based study conducted among 1646 adolescent female having age limit 14-19 years. Only unmarried adolescent females were included in the study however, females with gynecological, psychological or other medical problems were excluded from the study. It used validated and reliable questionnaire such as VAS for pain rating scale and DASS-21 for assessment of depression, anxiety, stress. Then, the descriptive data analysis and chi-square test were used to explore the relationship between psychological distress and

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dysmenorrhea. t-test was used to compare psychological distress between dysmenorrhea and non-dysmenorrhea. $P < 0.05$ was considered as significant.

Results: Mean age of the adolescent female was 15.91 ± 1.27 years. Prevalence of dysmenorrhea was 88.94%. Among dysmenorrhea 22.40% was severe, 28.89% was under moderate and 48.71% was under mild dysmenorrhea. There was significant difference of psychological distress indices scores between dysmenorrhea and non-dysmenorrhea ($p < 0.001$). Majority of dysmenorrheic females had severe to extreme severe levels of anxiety, depression and stress in contrast to non-dysmenorrheic females who have mild to moderate level. Significant association was noted between depression, anxiety, mental irritability and mood swing with primary dysmenorrhea ($p < 0.001$).

Conclusion: The present study suggested that dysmenorrhea is associated with psychological distress including anxiety, depression, mental irritation and mood swing. Psychological interventions and counselling are important for young women with primary dysmenorrhea to lessen the severity of menstrual pain.

Keywords: Primary dysmenorrheal; anxiety; depression; mental irritation; stress.

1. INTRODUCTION

Dysmenorrhea is one of the most common gynecological complaint in women in the reproductive age. It is defined as a painful cramping sensation in the lower abdomen which may also radiate to the back and thighs and occur just before or during the menstruation or both [1]. There are two category of dysmenorrheal. They are primary and secondary dysmenorrhea. Primary dysmenorrhea defines as menstrual pain without any pelvic pathology and usually happens within a year of menarche [2]. Secondary dysmenorrhea refers to a menstrual pain caused by pelvic pathology such as fibroids, pelvic inflammatory disease or endometriosis and arises later in life [3].

Dysmenorrhea, menstrual disorder is accompanied by various symptoms including headache, nausea, vomiting, fatigue chills and muscle cramps and disrupt the quality of life and social activities of young women [4]. 3-33% women suffer in severe pain lasting for 1-3 days in each monthly menstrual cycle [5]. Severe dysmenorrhea causes inability to function and absence from occupation [6]. Because of painful menstrual cramp approximately 1% of women of reproductive age are unable to do their job due to severe dysmenorrhea for 1-3days each month and approximately 14% of girls are absent from school/college for 1-2 days each month [7]. Dysmenorrhea has negative impact on daily life, lower education performance at puberty, poor sleep quality and mood resulting in anxiety and depression [8]. Dysmenorrhea has socioeconomic impacts because of the increased need of medical care and associated medical

costs as well as decreased women's effectiveness in day-to-day tasks [9].

The epidemiology of primary dysmenorrhea is difficult to establish because the symptoms perceived differentially by different women and also diversity in diagnostic criteria. The prevalence varies across different countries from 16 to 91% [9,10] out of which 2-40% report as moderate to severe. The true prevalence of primary dysmenorrhea is not yet established clearly in India. Kamble et al. [11] reported the prevalence of 72.5% among Indian school going adolescent. Several research finding showed that the proportions of primary dysmenorrhea in young females are higher. A recent large Australian study of senior high school girls found that a higher proportion, 93% of teenagers reported of menstrual pain [10].

Though dysmenorrhea is not life-threatening, it is one of the important factors that lower the quality of life, reduced social activities and absent from school or work among young women. Women with dysmenorrhea are vulnerable to have higher levels of depression, anxiety, negative self-perception and hostility [12]. Dysmenorrheic women are also prone to reduce productivity, creativity and job performance [13]. Among these complications, depressive disorder is one of the most commonly reported issue in women with dysmenorrhea. Liu et al [14] reported that subjects with primary dysmenorrhea were susceptible to depression in respect to non-dysmenorrhea counter-part. Only a few studies regarding association of dysmenorrhea with depression are available in the literature [15-17]. However, most of these data were international. The aim of this study was to confirm the

association between psychological and gynecological health. This study explores the prevalence of dysmenorrhea and its correlation with psychological distress among Bengali adolescent females.

2. MATERIALS AND METHODS

2.1 Subject

A cross-sectional study was done in Hooghly district and adjoining areas. The population was unmarried Bengali female adolescent students who were randomly selected from colleges and schools in the age group between 14 to 19 years. Willingness of the subject was considered. A total of 1646 female students were involved in the study. Students having age less than 14 years or more than 19 years, those who were taking regular drugs or hormonal therapy and suffering from chronic disorders including diabetes mellitus, clinically established hypertension, liver cirrhosis and kidney disease, suffering with secondary dysmenorrhea were excluded from the study.

2.2 Questionnaire

A self-administered questionnaire having questions related to their age, menarche age, different life style factors & menstrual factors such as the age when menarche appear, duration of menses, regularity, presence of blood clot in menstrual flow, duration of menstrual cycle and menstrual pain were applied. The questionnaires were translated to the local language (Bengali) as well. Dysmenorrheic assessment was done and clarified on the basis of pain scale.

2.3 Anthropometric Measurement

Body weight was measured in light clothing and bare feet using bathroom scale accurate to 0.5kg. The scale was kept on a flat surface and adjusted with '0' mark. Now the subject was requested to step on it in bare feet. Weight was recorded to the nearest 0.5kg. Height was measured using anthropometric rod without footwear on to the nearest 0.1 cm [18]. BMI was calculated from the height and weight using following equation: $BMI (kg/m^2) = \text{weight (kg)} / \text{height}^2 (m)$.

2.4 VAS (Visual Analogue Scale)

The intensity of menstrual pain was assessed by using visual analogue scale [19]. The visual

analogue scale is a 10 cm / 100 mm long scale. VAS had been recommended: no pain (0-4mm), mild pain (5-44 mm), moderate pain (45-74mm), and severe pain (75-100 mm). All students are divided into four classes on the basis of scores obtained from VAS.

2.5 DASS – 21 (Depression Anxiety Stress Scale)

Depression, Anxiety and stress were calculated by using DASS 21 (Depression Anxiety Stress Scale) [20]. The DASS is a self-report instrument, and no special skills are required to administer it. There are 21 items that need to be scored and the assessor advises the subjects to consider what they have experienced in the past week as well as at the present and to choose the answer that first comes in mind. Depression symptoms related items are question number 3, 5, 10, 13, 16, 17, 21. Depression levels were selected from summation of total scores. Similarly, Anxiety disorder related items are question number 2, 4, 7, 9, 15, 19, 20. Degree of anxiety was selected from summation of total scores. Stress disorder related items are question number 1, 6, 8, 11, 12, 14, 18. Degree of stress was selected from summation of total scores (Table 1).

2.6 Statistical Analysis

Quantitative data were presented as percentage and/or Mean \pm standard deviation. t-test was done to determine significant of difference between females with dysmenorrhea and without dysmenorrhea. Chi-square test was applied to determine significant of association between dysmenorrhea and psychological factors. Also the predictive psychological factors of dysmenorrhea were evaluated using bivariate and multivariate logistic regression analysis. The significance level of the tests were considered at a significance level of 0.05. Prevalence of dysmenorrhea on the basis of degree of distress was presented in bar diagram.

3. RESULTS

Average age of participants was 15.91 ± 1.27 years ranging from 14 to 19 years. Mean BMI of the participants was $21.02 \pm 4.42 kg/m^2$. 88.94% of study girls were dysmenorrheic. Around 43% had mild pain, 25.7% reported the pain score as moderate and around 20% had severe pain score (Fig. 1).

Table 1. Severity of psychological stress on the basis of DASS-21

Score of Psychological factors			Severity/Degree
Depression	Anxiety	Stress	
0-4	0-3	0-7	Normal
5-6	4-5	8-9	Mild
7-10	6-7	10-12	Moderate
11-13	8-9	13-16	Severe
>14	>10	>17	Extreme severe

*Reference [20]

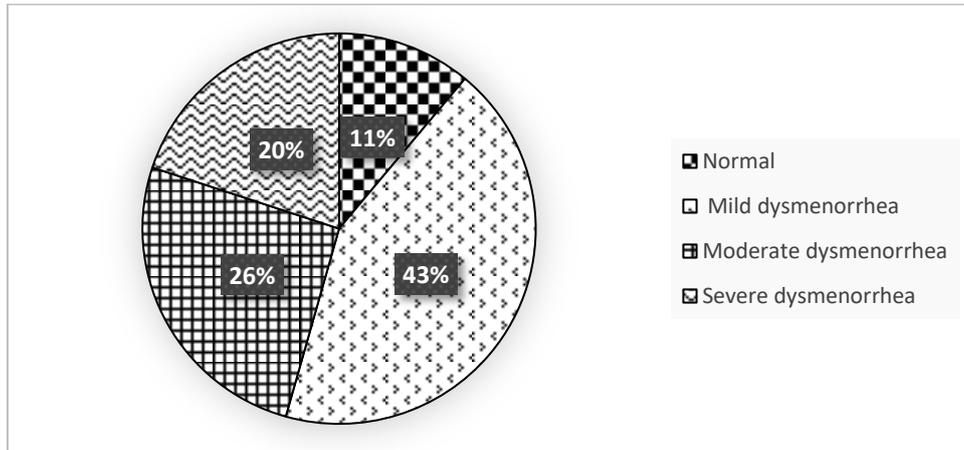


Fig. 1. Prevalence of primary dysmenorrhea among adolescent females

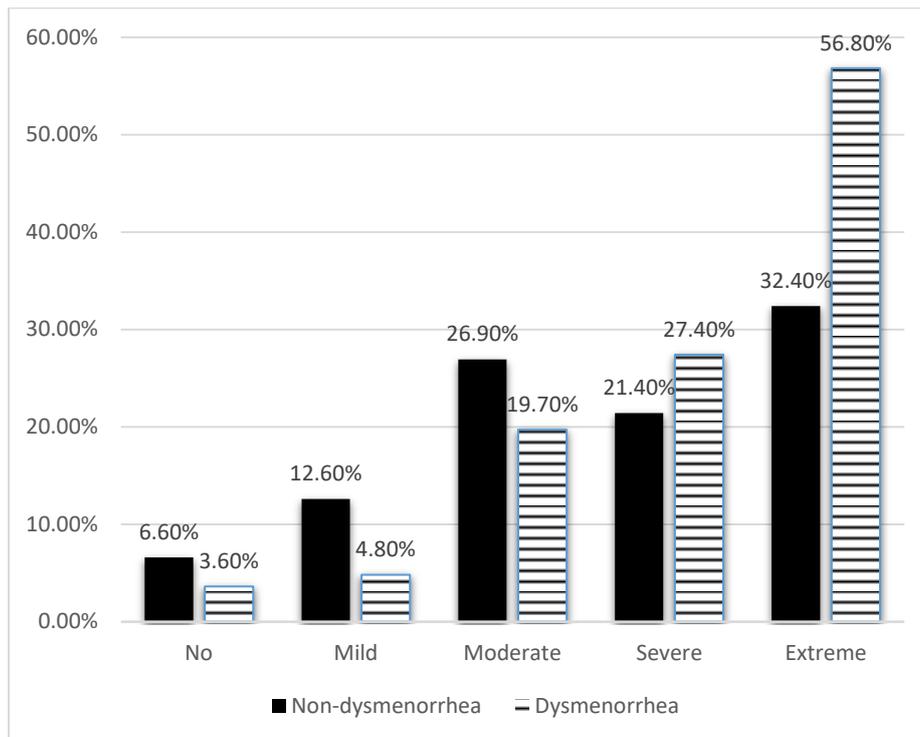


Fig. 2. Comparison of degree of anxiety between female with dysmenorrhea and without dysmenorrhea

Mean scores for anxiety, depression and stress was significantly higher in females with dysmenorrhea in compare with females without dysmenorrhea ($p < 0.001$). Score levels for all above mentioned variables had an increasing degree of dysmenorrhea. Thus maximum difference was observed between female without dysmenorrhea and female with severe dysmenorrhea (Table 2).

Most of the dysmenorrheic female were under severe to extreme psychological distress while non-dysmenorrheic female were under zero to moderate distress (Fig. 2 to Fig, 4).

Dysmenorrhea affects mood. Prevalence mental irritation and mood swing is more among adolescent with dysmenorrhea than non-dysmenorrhea counter parts (Figs. 5 and 6).

Chi square test was used to investigate association between psychological factor and dysmenorrhea. All tested psychological factors (anxiety, depression and stress) are significantly associated with degree of dysmenorrhea ($p < 0.001$). Chi square values were more for anxiety and depression than stress (Table 3). Statistically significant association was noted between mood swing and mental irritation with dysmenorrhea (Table 3).

Table 2. Comparison of stress, anxiety and depression levels of adolescent females with and without dysmenorrheal

Dysmenorrhea	n	Stress		Anxiety		Depression	
		Scores (mean \pm SD)	p	Scores (mean \pm SD)	p	Scores (mean \pm SD)	p
No	182	10.94 \pm 4.60*	----	7.78 \pm 4.60*	----	9.28 \pm 4.47*	----
Mild	713	12.02 \pm 4.16	<0.001	9.50 \pm 4.44	<0.0005	10.85 \pm 3.87	<0.0005
Moderate	423	13.03 \pm 3.87	<0.0005	10.71 \pm 4.45	<0.0005	11.74 \pm 3.83	<0.0005
Heavy	328	14.20 \pm 3.89	<0.0005	12.00 \pm 4.48	<0.0005	12.90 \pm 3.70	<0.0005

*Reference group

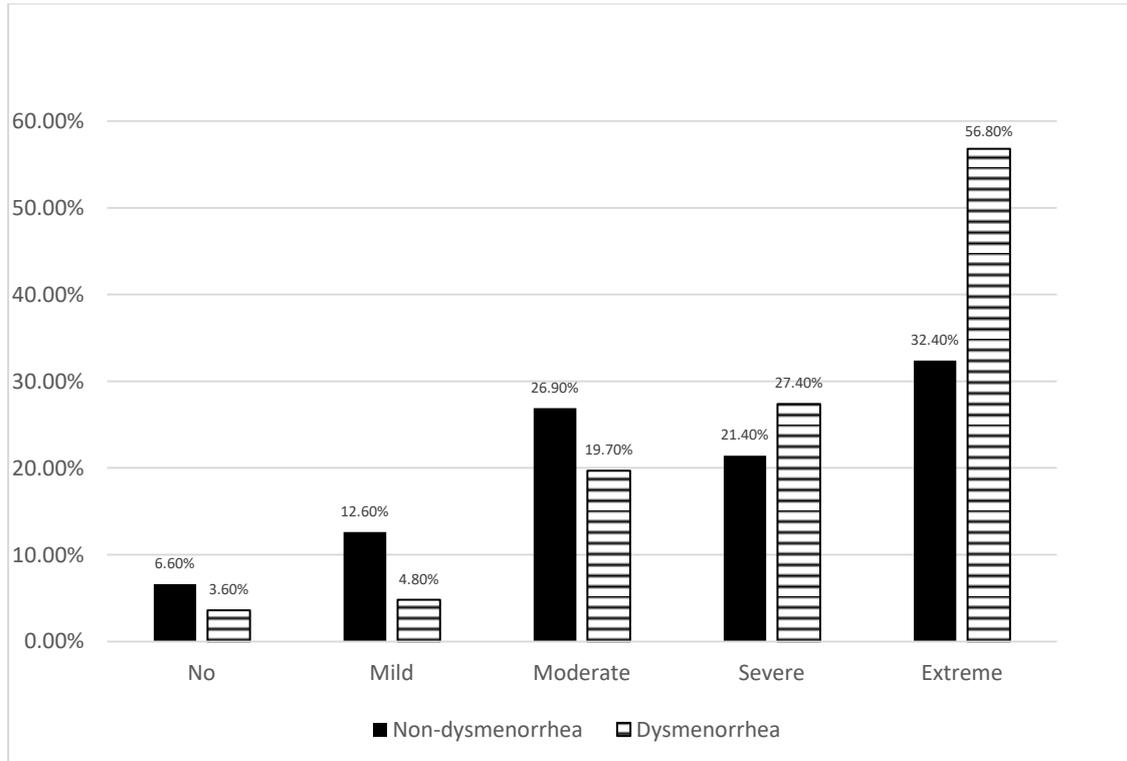


Fig. 3. Comparison of degree of depression between female with dysmenorrhea and without dysmenorrhea

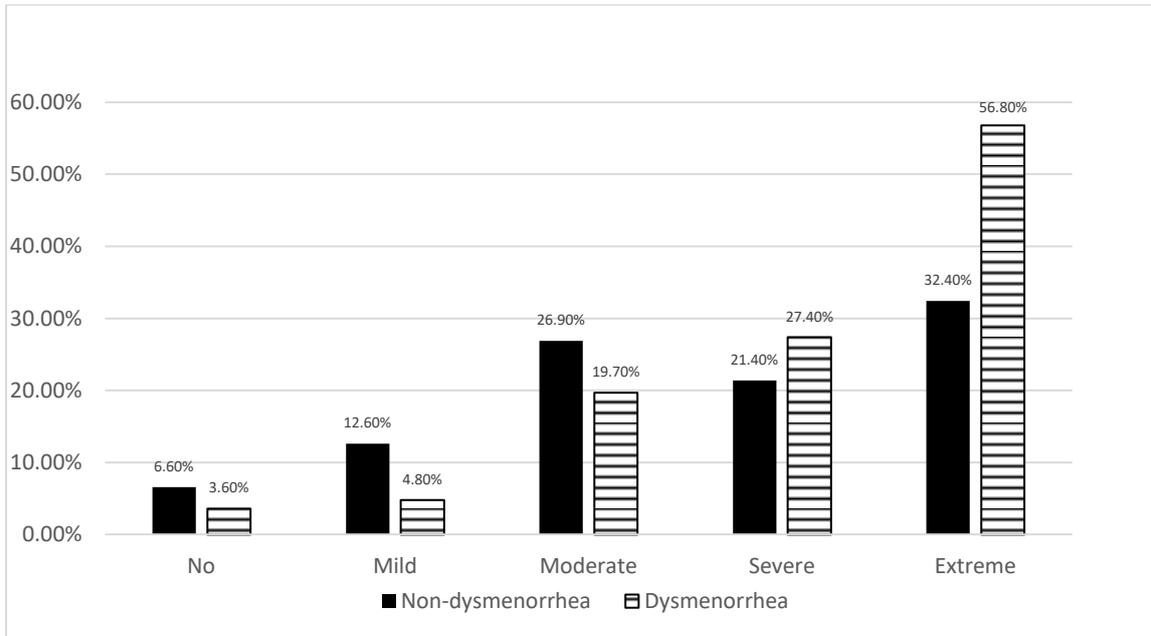


Fig. 4. Comparison of degree of stress between female with dysmenorrhea and without dysmenorrhea

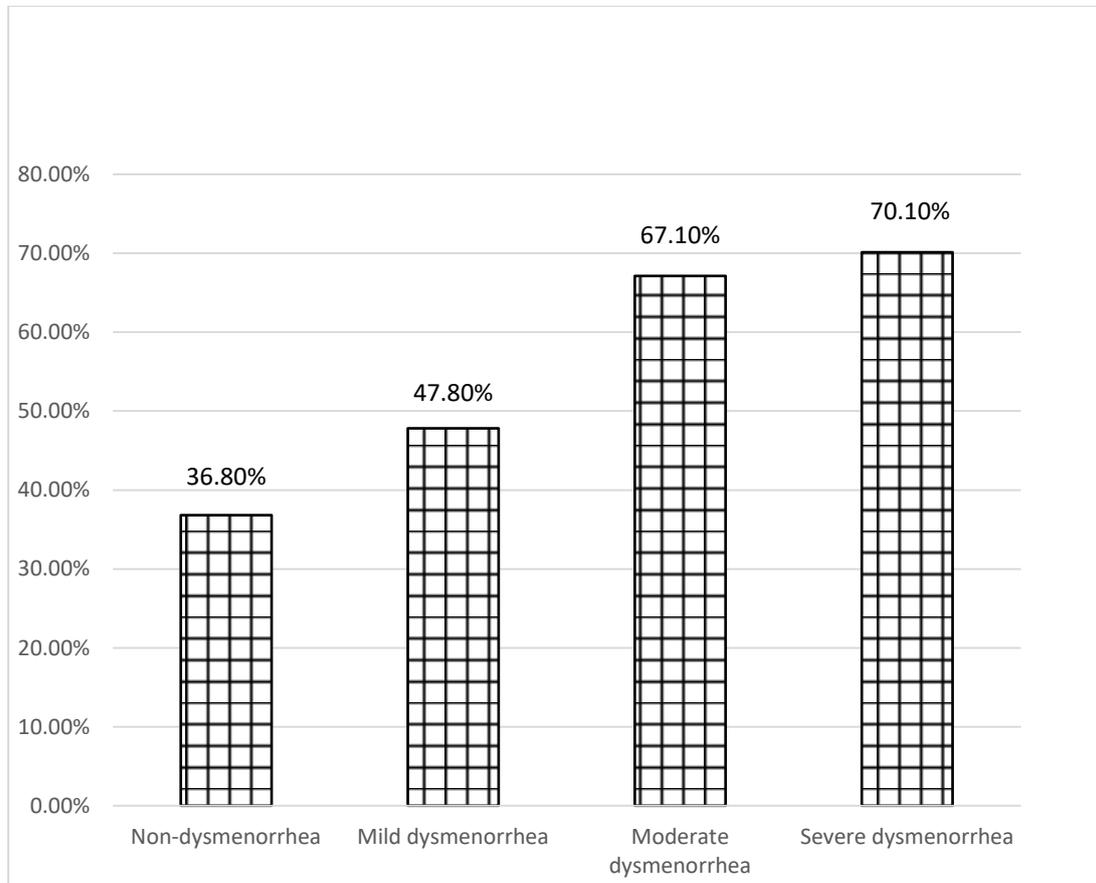


Fig. 5. Comparison of prevalence of mental irritation of adolescent females without dysmenorrhea and with dysmenorrhea

Table 3. Chi square statistics for dysmenorrhea psychological distress

Independent variables	Dependent variables	Chi square
Anxiety	Degree of dysmenorrhea	56.40 (df =4; p<0.001)
Depression		51.34 (df =4; p<0.001)
Stress		32.57 (df =4; p<0.001)
Mental irritability	Incidence of Dysmenorrhea	28.59 (df =1; p<0.001)
Mood swing		36.18 (df =1; p<0.001)

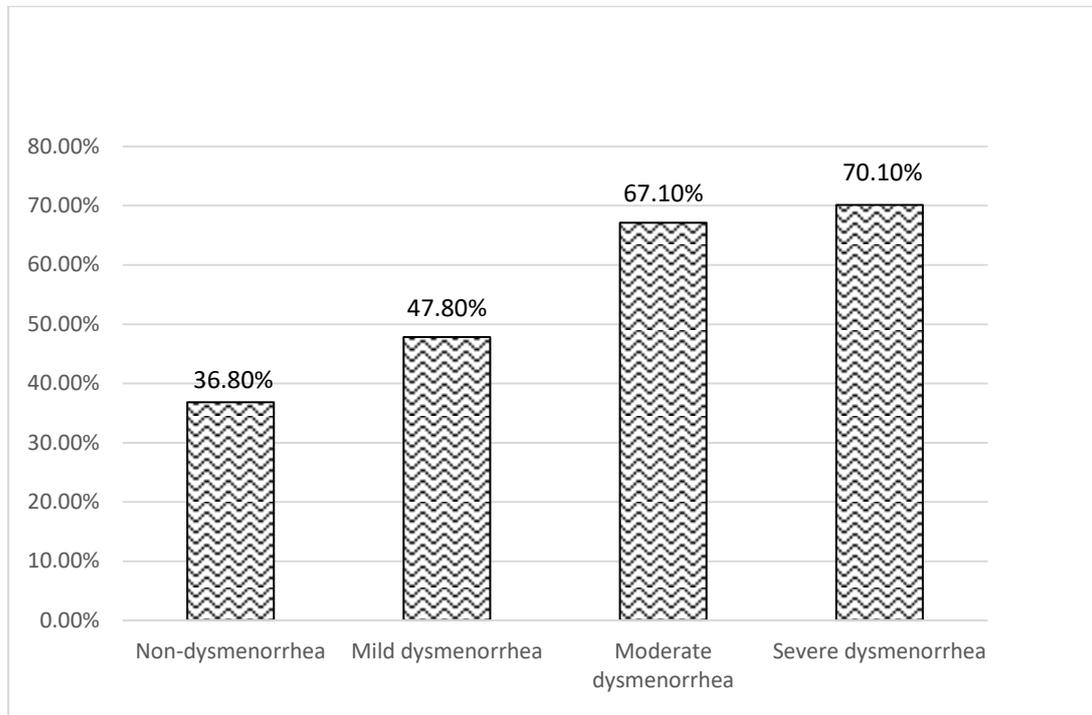


Fig. 6. Comparison of prevalence of mood swing of adolescent females without dysmenorrhea and with dysmenorrheal

The predictive psychological factors of dysmenorrhea were evaluated using multivariate logistic regression analysis. The results of logistic regression for predictive psychological factors are shown in Table 4. According to this analysis all the tested psychological factors are strong predictor of dysmenorrhea.

4. DISCUSSION

An association between psychological factors and dysmenorrhea has been described since 1978. There is increasing evidence that psychological disorder co-exist with dysmenorrhea [21]. This study found that 89% of adolescent females suffered from dysmenorrhea. This observation was consistent with previous studies (16). This study further suggested that nearly 51% of dysmenorrheic females experienced moderate to severe dysmenorrhea while in Ethiopia 28.5% had moderate to severe,

in Malaysia 6.8% had moderate to severe and in Jordan 55.8% had moderate to severe dysmenorrhea. Such vast differences may be due to the scales used for assessment of pain [22-23].

The relationship between psychological factors and dysmenorrhea showed statistically significant results (p<0.05). All tested psychological factors are significantly higher (p<0.001) in female with dysmenorrhea than female without dysmenorrhea. These results are consistent with the previous study Bajalan et al. [24]. Higher percentage of dysmenorrheic female experienced severe to extreme psychological stress than non-dysmenorrheic counter parts. Results of this study are consistent with the previous study [25] that found higher risk of having dysmenorrhea in women with high stress than women with low stress.

Table 4. Bivariate and multivariable analysis of associated factors of dysmenorrhea

Variables	Categories	Dysmenorrhea		Odd ratio	95% CI	
		No	Yes		Lower	Upper
Anxiety	No	27	114	1	--	---
	Mild	37	129	0.826	0.473	1.440
	Moderate	35	158	1.056	0.613	0.866
	Severe	20	230	2.724	1.465	5.064
	Extreme severe	63	833	3.132	1.916	5.119
Depression	No	27	67	1	--	---
	Mild	26	94	1.457	0.781	2.717
	Moderate	49	405	3.331	1.948	5.694
	Severe	48	421	3.535	2.065	6.049
	Extreme severe	32	477	6.007	3.389	10.648
Stress	No	14	50	1	--	---
	Mild	22	72	0.916	0.428	1.962
	Moderate	49	288	1.646	0.846	3.202
	Severe	39	401	2.879	1.462	5.670
	Extreme severe	58	653	3.152	1.645	6.042
Irritability	No	140	823	1	--	---
	Yes	42	641	2.596	1.811	3.721
Mood swing	No	109	597	1	--	---
	Yes	73	867	2.168	1.584	2.969

Among the psychological factors studied, majority of dysmenorrheic females had severe to extreme severe levels of anxiety, depression and stress in contrast to non-dysmenorrheic females who have mild to moderate level of anxiety, depression and stress (Figs. 2-4). Anxiety, depression and stress were prevailed in dysmenorrheic females particularly towards the severe or extremely severe based on DAAS calculation.

This study revealed that adolescent female with dysmenorrhea reported significantly higher mental distress like depression, anxiety and stress compared to female without dysmenorrhea. Thus, dysmenorrhea causes psychological distress which supports previous observations [26]. Previous studies indicate that the severity of dysmenorrhea was related with psychological distress [27,28]. These findings were consistent with previous observation as female with severe dysmenorrhea having higher distress. This study noted significant association of dysmenorrhea with anxiety and depression in multivariate logistics regression analysis ($p < 0.00$). The pain and discomfort caused by dysmenorrhea make the female become tired and affect the mood as mood swing was associated with dysmenorrhea ($p < 0.00$). Thus adolescent females must be under family support during menstruation otherwise menstrual pain will be severe by means of vicious cycle between pain and psychological distress.

One of the limitations of the present study was that data were collected using self-administered questionnaires and therefore data were susceptible to recall bias. In addition the present study was cross-sectional and as such cannot demonstrate a cause-effect relationship between dysmenorrhea and psychological distress as risk factor.

5. CONCLUSION

On the basis of finding, it was concluded that primary dysmenorrhea is not an uncommon problem among Bengali adolescent students. Dysmenorrhea is found to be highly prevalent among adolescent female students having age limit 14-19 years. The dysmenorrhea was significantly associated with psychological distress including depression, anxiety, mental irritability and mood swing. The degree of menstrual pain in primary dysmenorrhea was positively related with psychological distress. Thus it is important to promote the awareness of students, health professionals and physicians regarding the psychological issues of menstruation.

CONSENT

The study was non-invasive. The prior written permission of the Institutional authority was taken. The written informed consent was

obtained from the study participants and their parent after the purpose of the study was explained. Participants were informed that the data obtained from them would be kept confidential.

ETHICAL APPROVAL

Written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Balik G, Ostoner I, Kagitci M, Sahin FK. Is there a relationship between mood disorders and dysmenorrhea? *J Pediatr Adolesc Gynecol.* 2014;27(6):371-374. DOI: 10.1016/j.jpag.2014.01.108
2. Vincenzo DeSanctis M, Soliman A, Bemsoni S, Bianchin L, Bona G, Bozzola M, et al. Primary Dysmenorrhea in adolescents: Prevalence, impact and recent knowledge. *Pediatr Endocrinol Rev.* 2015;13(2):465-73. Available;https://pubmed.ncbi.nlm.nih.gov/26841639/ PMID: 26841639.
3. Berek JS. *Berek and Novak' s gynecology (15th edn)*, Wolters Kluwer Health/ Lippincott Williams and Wilkins, Philadelphia, PA; 2012. DOI: 10.1007/s13224-014-0538-z
4. Iacovides S, Avidon I, Bentley A, Baker FC, Reduced quality of life when experiencing menstrual pain in women with primary dysmenorrhea. *Acta Obstet Gynecol Scand.* 2014;93(2):213-217. DOI: 10.1111/aogs.12287
5. Bernardi M, Lazzeri L, Perelli F, Reis FM, Petraglia F. Dysmenorrhea and related disorders. *F1000 Research.* 2017; 6(F1000 Faculty Rev):1645. DOI: 10.12688/f1000research.11682.1
6. Zannoni L, Giorgi M, Spagnolo E, Montanari G, Villa G, Seracchioli R. Dysmenorrhea, absenteeism from school and symptoms suspicious for endometriosis in adolescents. *J Pediatr Adolesc Gynecol.* 2014;27(5):258-265. DOI: 10.1016/j.jpag.2013.11.008
7. Gagua T, Tkeshelashvili B, Gagua D, McHedlishvili N. Assessment of anxiety and depression in adolescent with primary dysmenorrhea: A case control study. *J Pediatr Adolesc Gynecol.* 2013;26(6):350-354. DOI: 10.1016/j.jpag.2013.06.018
8. Vitale SG, La Rosa VL, Rapisarda AMC, Lagana AS. Impact of endometriosis on quality of life and psychological well-being. *J Psychosom Obstet Gynaecol.* 2017; 38(4):317-319. DOI: 10.1080/0167482X.2016.1244185
9. Ju H, Jones M, Mishra G. The prevalence and risk factors of dysmenorrhea. *Epidemiol Rev.* 2014;36(1):104-113. DOI: 10.1093/epirev/mxt009
10. Parker M, Sneddon A, Arbon P. The menstrual disorder of teenagers (MDOT) study: Determining typical menstrual patterns and menstrual disturbance in a large population based study of Australian Teenagers. *BJOG.* 2010;117(2): 185–192. Available:https://doi.org/10.1111/j.1471-0528.2009.02407.x
11. Kamble PP, Jain P, Singh H. Prevalence of dysmenorrhea among adolescent school girls: an institutional based study. *Int J Med Res Professionals.* 2021;7(1):5-7. DOI: 10.21276/ijmrp.2021.7.1.002
12. Kabukcu C, Kabukcu BB, Basay O. Primary dysmenorrhea in adolescents: Association with attention deficit hyperactivity disorder and psychological symptoms. *Taiwan J Obstet Gynecol.* 2021;60:311-317. DOI: 10.1016/j.tjog.2021.01.033
13. Yoshino O, Takahashi N, Suzukamo Y. Menstrual symptoms, health-related quality of life and work productivity in Japanese women with dysmenorrhea receiving different treatments: Prospective observational study. *Adv Ther.* 2022;39: 2562-2577. DOI: 10.1007/s12325-022-02118-0
14. Liu J, Liu H, Mu J, Xu Q, Chen T, Dun W, et al. Altered white matter

- microarchitecture in the cingulum bundle in women with primary dysmenorrhea: a tract-based analysis study. 2017;38:4430-4443.
DOI: 10.1002/hbm.23670
15. Unsal A, Tozun M, Ayrancin U, Orsal O. Connection between dysmenorrhea and depression among a group of Turkish high school female students. *Pakistan J Med.* 2012;28(3):424-427.
Available: <https://pjms.com.pk/index.php/pjms/article/view/1992/470>
 16. Sinha S, Srivastava JP, Sachan B, Singh RB. A study of menstrual pattern and prevalence of dysmenorrhea among school going adolescent girls in Lucknow district, Uttarpradesh, India. *Int J Community Med Pub Health.* 2016;3(5):1200-1203.
Available: <https://doi.org/10.18203/2394-6040.ijcmph20161384>
 17. Alattq D, Binsuwaidan L, Alazwari L, Algarni M, Al Hussain M, Alzahrani R, Aljohani R. Dysmenorrhea and depressive symptoms among female university students: a descriptive study from Saudi Arabia. *Egypt J Neurol Psychiatry Neurosurg.* 2022;58:106-113.
DOI: 10.1186/s41983-022-00542-1
 18. Pramanik P, Ganguli IN, Chowdhury A, Ghosh B. A study to assess the respiratory impairments among three wheeler auto taxi driver. *International J. LScPharma Res.* 2013;3(1):94-98.
Available: <https://pdfs.semanticscholar.org/f0c1/f3ddf80087d579e816430b4b0c38163ba67b.pdf>
 19. Kerststen P, White JP, Tennant A. Is the Pain Visual Analogue Scale Linear and Responsive to Change? An Exploration Using Rasch Analysis. *PLOS ONE.* 2014; 9(6):1-10.
DOI: 10.1371/journal.pone.0099485
 20. Oei Tian PS, Sawang S, Goh YW, Mukhtar F. Using the depression, anxiety stress scale-21 (DASS-21) across cultures. *Int J Psychol.* 2013;48(6): 1018-1029.
DOI: 10.1080/00207594.2012.755535
 21. Adib-Rad H, Kheirkha F, Faramarzi M, Omidvar S, Basirat Z, Ahmadi MH. Primary dysmenorrhea associated with psychological distress in medical science students in the North Iran: A cross sectional study. *Int J Fertil Steril.* 2022; 16(3):224-229.
DOI: 10.22074/IJFS.2022.542056.1216
 22. Hong Ju, Jones M, Mishra G. The prevalence and risk factors of dysmenorrhea. *Epidemiol Rev.* 2014; 36(1):104-113.
DOI: 10.1093/epirev/mxt009
 23. Kural MR, Noor NN, Pandit D, Joshi T, Patil A. Menstrual characteristics and prevalence of dysmenorrhea in college going girls. *J Family Med Primary Care.* 2015;4(3):426-431.
Doi: 10.4103/2249-4863.161345
 24. Bajalan Z, Moafi F, Moradi Baglooei M, Alimoradi Z. Mental health and primary dysmenorrhea: A systematic review. *J Psychosomatic Obste Gynaecol.* 2018; 40(3):185-194.
DOI: 10.1080/0167482X.2018.1470619
 25. Firdous U, Fatima N, Yasmeen G. Assessment of anxiety, stress and depression in primary dysmenorrheic females. *Int J Endorsing Health Sci Res.* 2019;7(3):147-153.
Available: <https://doi.org/10.29052/IJEHSR.v7.i3.2019.147-153>
 26. Hajar AR, Farzan K, Mahbobeh F, Shabnam O, Zahra B, Mahmoud HA. Primary dysmenorrhea associated with psychological distress in medical sciences students in the North of Iran: A cross sectional study. *Inter J Fertility Sterility.* 2022;16(3):224-229.
DOI: 10.22074/ijfs.2022.542056.1216
 27. Faramarzi M, salmalian H. Association of psychological and non-psychological factors with primary dysmenorrhea. *Iran Red Crescent Med J.* 2014;16(8):e16307.
DOI: 10.5812/ircmj.16307
 28. Wang C, Liu Y, Dun W, Zhang T, Yang J, Wang K, et al. Effects of repeated menstrual pain on empathic neural responses in women with primary dysmenorrhea across the menstrual cycle. *Hum Brain Mapp.* 2021;42(2):345-356.
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