

Prevalence and Factors Associated with Primary Dysmenorrhea among Indian Adolescent Girls - An Observational Study

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Abstract: *Dysmenorrhea is a term used to describe pain associated with menstruation. In primary dysmenorrhea the pain is felt in the lower abdomen and the sacral region in the first hours of menstruation. There exists no structural abnormality or pathology. Pain decreases with increase in blood loss* **Objectives:** *To establish the prevalence and explore the factors associated with primary dysmenorrhea in the adolescent age group (13-19years). Secondary Objectives: 1) To establish a relationship between the Body Mass Index with the prevalence of dysmenorrhea among adolescents. 2) To find out the quality and severity of pain experienced by young women. 3) To find out the various treatment methods used for relieving pain/ discomfort. 4) To find out the risk factors associated with dysmenorrhea. 5) To establish the relationship between level of stress and dysmenorrhea. 6) To establish a relation between socio-economic status and dysmenorrhea. Method: 100 adolescent girls were included in the study. A questionnaire was distributed which included questions regarding menstrual history, pain assessment, family history, associated symptoms, management, functional impairments, nutritional habits, risk factors, stress and socio-economic status. The BMI of each student was also calculated. Result and Conclusion: It has been established that there is a very high prevalence of dysmenorrhea among the adolescent girls in rural Maharashtra, India. The severity of pain experienced and the techniques used to alleviate the pain is varied amongst the population. The most common predisposing factors are found to be early age at menarche, family history, consumption of tea / coffee, exercising habits, stress and lifestyle. It is found that having a low BMI is one of the strongest predictor of dysmenorrhea.*

Keywords: Dysmenorrhea, Primary Dysmenorrhea, Adolescents, Pain

1. Introduction

Dysmenorrhea is one of the most common gynecological problem faced by women of all ages. It not only disturbs their routine but also causes humiliating suffering. It is a common cause for sickness absenteeism from classes and work by the female student community. It is a public health problem with its high prevalence, suffering, and considerable economic losses. (1) (2)

Definition of Dysmenorrhea: Dysmenorrhea is a term used to describe pain associated with menstruation. The condition may be primary or secondary.

Primary or spasmodic dysmenorrhea: The pain is felt in the lower abdomen and the sacral region in the first hours of a period and it may be colicky. There exists no structural abnormality or pathology. Pain decreases with increase in blood loss.

Secondary or congestive dysmenorrhea: This is associated with some structural abnormality or pathology. For example: A fibroid, endometriosis or infection. (3)

Dysmenorrhea arises during menstrual bleeding owing to lower abdominal pain brought on by menses, and is not a gynecological disorder.

2. Definition of Adolescence

The World Health Organization (WHO) defines an adolescent as a young person between ages 10 and 19. (4)

Adolescence (from Latin adolescere, meaning 'to grow up') is a transitional stage of physical and psychological development that generally occurs during the period from puberty to legal adulthood (age of majority). (5)(6)(7)

A dysmenorrhea incidence of 33.5% was reported by Nag (1982) among adolescent girls in India (8). However, that long ago, prevalence of dysmenorrhea was not widely established. So according to a study conducted by Anil K Agarwal and Anju Agarwal the prevalence was found to be 79.67% in the year 2002(9). According to recent study conducted by Jaywant Yashwant Aher and Kiran MahendraRajole in the year 2016 in Nashik, 65.82% women between 18-24 years of age suffered with dysmenorrhea (10). A study conducted in Debremarkos town, North-West Ethiopia, in the year 2017 by Muluneh AA, Nigussie TS, et al, and states that the prevalence of dysmenorrhea among the interviewed women was 69.3% (11).

A variation in the ages of menarche has been recorded all over the world. A study conducted by Praveen Kumar Pathak, et. al. about Secular Trends in Menarcheal Age in India found the mean age at menarche among Indian women to be 13.76 years in 2005. They established a reduction of nearly one month per decade, suggesting a secular decline in age at menarche among Indian women. Notably, the menarcheal age was significantly associated with the area of residence, geographic region, linguistic groups, educational attainment, wealth status, caste and religious affiliations among Indian women [12]. With the evidence of the literature, it can be said that there lies variations among different societies in regards with the prevalence of dysmenorrhea. Also, it is unclear the extent to

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which young women are incapacitated each month due to severity of dysmenorrhea. However, it is well known that dysmenorrhea not only presents differently among different women but it is also perceived and managed differently. Understanding the full range of dysmenorrhea among adolescent girls is a crucial point in developing appropriate management and preventive strategies. Since dysmenorrhea is so common, many women consider it a natural phenomenon and rarely seek medical treatment owing to their cultural and religious attitudes (13) or because they feel that they can tolerate the pain (14).

Despite its high prevalence rate and effect on daily life, 76.1% of women still believe that dysmenorrhea is a natural part of a women's menstrual cycle, and only 14.8% believe that treatment is necessary (14).

There is an association between pattern of menstruation and dysmenorrhea as recorded in other studies in which the people with irregular menstrual patterns suffered more menstrual pain than people with regular menstrual patterns [25]. Also, menstrual irregularity proved to be a strong predictor of dysmenorrhea in a study carried out in Palestinian students [16].

Menstrual bleeding over 5 days is proved to be an important risk factor of dysmenorrhea by a study conducted by MoolRaj Kural et. al. [26].

A study conducted in Debremarkos and Mexico found an association between [20, 24] between presence of dysmenorrhea and heavy menstrual flow.

The studies conducted in Ethiopia, Jeddah, Dammam and Iran have found correlation between familial predispositions of dysmenorrhea [17, 33, 34, 35]. A possible explanation that some researches have reported is that daughters of mothers who have menstrual complaints also experience menstrual discomfort which is related to behavior that is learned from the mother [26].

A significant relationship between dysmenorrhea and high intake of sugar has been established in Ethiopia and Turkish university students in which dysmenorrhea was higher in women with excessive intake of Coco-cola/ Pepsi [17, 40].

Breakfast is the strongest predictor of intensity of dysmenorrhea pain. The relationship between breakfast and intensity of pain has been discussed by an article published in Japan where authors found out that students who skipped breakfast have a higher intensity of dysmenorrhea pain. [41]

Physical activity was found to have a significant association with the occurrence of dysmenorrhea in the Debremarkos Berhan University students in Ethiopia [11] in which they found out that carrying out physical activity decreased the prevalence of dysmenorrhea.

Several studies give an explanation for association between stress and dysmenorrhea by relating stress with the cascade of neuro-endocrinal responses [33]. Dorn et al. [35] reported that emotional disturbances may cause menstrual cycle

abnormalities especially dysmenorrhea. The studies of in Tiwan, Jeddah and Iran are an evidence for this relationship [14, 33, 35].

Many studies revealed that having low BMI is an important risk factor for primary dysmenorrhea. [28, 29, 43].

The most common symptoms found in various studies are fatigue and nervousness among Palestinian university students [16], depressed mood among the nurses in Saudi Arabia [36], headache in a study conducted in Ethiopia [17] and among Thai secondary school students in KhonKaen the major symptoms were mood change (84.8%), headache (37.5%), and backache (63.7%) [37].

The commonly affected activities include concentration, test taking skills, limited socialization and limited sport participation. This is derived from the studies conducted in KhonKaen, Thailand and Hispanic female adolescents [37, 38].

In Ethiopia, school absenteeism was reported to be 80% [17] while school attendance was the least activity affected by menstrual problems reported by only 7.7% of respondents in Egypt [15].

3. Review of Literature

- 1) Muluneh AA, Nigussie TS, Gebreslasie KZ, Anteneh KT, Kassa ZY conducted a study on "Prevalence and associated factors of dysmenorrhea among secondary and preparatory school students in Debremarkos town, North-West Ethiopia" in the year 2017. The prevalence of dysmenorrhea among the women that were interviewed was 69.3%. The conclusion is that dysmenorrhea is more common with increasing age, among ladies with positive family history of dysmenorrhea, excessive sugar intake habit, early menarche and those having heavy menstrual periods.
- 2) Heba A. Abu Helwa, Areen A. Mitaeb, Suha Al-Hamshri and Waleed M. Sweileh conducted a study on "Prevalence of dysmenorrhea and predictors of its pain intensity among Palestinian female university students" in the year 2016. The conclusion is that there is a high proportion of dysmenorrhea among Palestinian female university students. Skipping breakfast was the strongest predictor for moderate/severe dysmenorrhea.
- 3) Subasinghe AK, Hapoo L, Jayasinghe YL, Garland SM, Gorelik A, Wark JD conducted a study on "Prevalence and severity of dysmenorrhoea, and management options reported by young Australian women" in the year 2016. The conclusion is that the prevalence of dysmenorrhea is critically high in this sample of young females, with many indicating that pain had a significant adverse impact on numerous daily activities.
- 4) Jaywant Yashwant Aher, Kiran MahendraRajole conducted a cross-sectional study of "Prevalence of Dysmenorrhea among Adolescent Girls" in the year 2016. The overall prevalence of dysmenorrhea was present in 156 (65.82%) girls out of 237 girls included in the study.
- 5) S Chhabra and S Gokhale conducted a study on "Practices for Prevention, Therapy of Primary

Dysmenorrhoea” in the year 2016. Of 282 girls, 197(69.86%) had dysmenorrhoea. Other methods used were lying down prone, yogic exercises and drinking milk with turmeric.

4. Methodology

Study design: Observational Study

Study setting: DVVVPF's College Of Physiotherapy, Ahmednagar.

Data Collection: Dr. Vithalrao Vikhe Patil Foundation's College of Nursing, Ahmednagar and Rupibai Motilalji Bora New English School, Ahmednagar, Maharashtra India

Sample size: 100 students

Sampling Method: Convenience Sampling

Data collection tools: A self-constructed questionnaire, weighing scale, measuring tape.

Inclusion Criteria

- Adolescents between 13-19 years of age.
- Adolescents willing to participate in the study.
- Participants who have previously had at least 6-7 menstrual cycles.

Exclusion criteria

- Participants who have known gynecological diseases.
- Participants who have undergone any major surgeries in the past one year.
- Participants with known endocrine disorders.
- Participants with mental/psychological problems.

A self-constructed questionnaire was designed in English and translated to Marathi after conducting an extensive literature search related to the factors affecting Dysmenorrhoea. It included questions regarding menstrual history, pain assessment, family history, associated symptoms, management, functional impairments, nutritional habits, risk factors, stress and socio-economic status. It included 23 close ended questions with multiple options. After obtaining a permission to conduct the study from the Principal of the school and the college, this study included healthy adolescents who met the inclusion criteria in age group of 13-19 years. A screening for inclusion and exclusion criteria was done.

A brief orientation lecture about the purpose of the study and potential benefits, was conducted and a written consent was taken from the students. The weight (kg) and the height (cm) of the students included in the study was measured and the BMI was calculated by the standard formula $\text{weight(kg)/height}^2(\text{cm})$.

The students were asked to tick mark their answer in the respected check box. Data regarding pain, associated symptoms, activity limitations, knowledge and methods used to manage the pain, nutritional habits, exercising habits, level of stress, etc. was collected. The severity of dysmenorrhoea was scored using the Wong Baker Faces Pain Rating Scale. The scale shows a series of faces ranging from a happy face at 0 which represents "no hurt" to a crying face at 10 which represents "hurts worst." Based on the faces and descriptions, the student chose the face that best describes

their level of pain. A Karl Rollinson's Stress Meter was included in the questionnaire to determine the level of stress of the students. A Modified Kuppuswamy Scale (2012) was also administered in order to sort the socio-economic classes of the students. The time taken by the students to answer the questionnaire was 15-20 minutes along with doubt solving. The entire session was of 1.5 hours in each institution. Each session included the following:

- 1) Introduction of self
 - 2) Introduction and purpose of the study
 - 3) Instructions
 - 4) Brief explanation about the questions
 - 5) Consent taking
 - 6) Answering of the questionnaire
 - 7) Doubt solving
 - 8) Height and weight measurement
 - 9) Collection of questionnaire
 - 10) Appreciation for time, participation and co-ordination.
- The data obtained was then entered in an Excel sheet and results were calculated

5. Results

Prevalence: 92%

Minimum Age: 13 years

Maximum Age: 19 years

Mean Age: 16.86 years

Mean Weight: 44.446 kg

Mean Height: 151.35 cm

Mean BMI: 20.25699 kg/cm²

Mean Kuppuswamy Scale Score: 15.34

Question no.	Question	Frequency
1	Age of Menarch	
	1) Before 14 years	44
	2) After 14 years	56
2	Regularity Of Cycle	
	1) Yes	79
	2) No	21
3	Length of Menses:	
	1) 2-3 days	7
	2) 3-4 days	35
	3) 4-5 days	40
	4) 5-6 days	8
	5) 6-7 days	4
4	Quantity of Flow	
	1) Little flow	9
	2) Moderate flow	68
	3) Heavy flow	19
	4) Very heavy flow	4
5	Severity Of Pain	
	1) No hurt	8
	2) Hurts little bit	26
	3) Hurts little more	33
	4) Hurts even more	16
	5) Hurts whole lot	5
6	Duration of Pain	
	1) Few hours before menses	13
	2) 1 st day of menses only	45
	3) 1 st to 3 rd day	24

	4) More than 3 days	10
	5) No pain	8
7	Frequency of Pain	
	1) Every month	48
	2) Most of the months	24
	3) Occasionally	12
	4) Rarely	8
	5) Never	8
8	Site of Pain	
	1) Lower abdomen	70
	2) Lower back	58
	3) Upper thigh	23
	4) None	8
9	Family History	
	1) Yes	69
	2) No	31
10	Other Problems	
	1) Vomiting	11
	2) Diarrhea	10
	3) Constipation	2
	4) Over eating	7
	5) Loss of appetite	28
	6) Cramps	16
	7) Fatigue	48
	8) Dizziness	18
	9) Headache	33
	10) Insomnia	14
	11) Breast tenderness	16
	12) Nervousness	23
	13) Depressed mood	34
	14) Abdominal bloating	25
	15) Loss of consciousness	9
	16) Joint pain	18
	17) None	17
11	Activity Limitation	
	1) Sports	38
	2) Socialization	15
	3) Concentration	52
	4) Test taking skills	17
	5) Grades (Marks)	15
	6) Daily chores	29
	7) None	27
12	Absenteeism In School	
	1) Yes, always	11
	2) Yes, sometimes	39
	3) No, never	50
13	Mood Changes	
	1) Yes	72
	2) No	28
14	Pain Management	
	1) Distraction	28
	2) Rest	65
	3) Heating pad	9
	4) Tea	12
	5) Medications (non-prescribed)	18
	6) Medications (prescribed)	13
	7) Exercise	1
	8) Food stuff (legumes, fish, bananas, etc.)	10
	9) Herbs (ginger, cinnamon, safflower, etc.)	2
	10) None	8
15	Physician/ Nurse or Manage At Home	
	1) Take help from a physician/ nurse	13
	2) Manage at home	77
	3) None	8

16. Nutritional Habits

	Never/Low	Moderate	High	Very High
A) Vegetables and fruits	10	61	21	8
B) Meat and protein rich diet	32	56	10	2
C) Sweets and sugary beverages	16	58	12	13
D) Salty foodstuff	27	52	14	7

17	Breakfast	
	1) Daily	70
	2) Sometimes	30
	3) Never	0
18	Tea/ Coffee	
	1) Daily	53
	2) Sometimes	29
	3) Never	18
19	Exercise Frequency	
	1) Daily	11
	2) Often	4
	3) Sometimes	60
	4) Never	25
20	Alcoholism/ Smoking	
	1) Yes	1
	2) No	98
	3) Sometimes	1
21	Accommodation	
	1) With Family	41
	2) In Dormitories (hostel)	59
22	Stress Level (Karl Rollinson's Stress Meter)	
	1) Totally relaxed	5
	2) Calm	12
	3) No stress	2
	4) Low stress	22
	5) Moderate stress	33
	6) High stress	8
	7) Overwhelmed	6
	8) Anxious	10
	9) Panic	1
	10) Danger	1
23	Socio-Economic Status (Modified Kuppaswamy Scale- 2012)	
A)	Education score of the head	Score
4	Professional or Honors	11
3	Graduate or Post Graduate	30
2	High School or Intermediate or Diploma	43
1	Illiterate or Primary School	17
B)	Occupation score of the head	Score
13	Legislators, Senior Officials, Manager	4
11	Professionals	13
9	Technicians and Associate Professionals	9
7	Clerks	1
6	Service Workers, Shop and Market Sales Workers	26
5	Skilled Agricultural and Fishery Workers	21
4	Craft and Related Trades Workers	5
3	Plant and Machine Operators and Assemblers	1
2	Unskilled Workers	15
1	Unemployed	5
C)	Monthly family income in Indian Rupees	Score
12	More than or equal to 32,050	17
10	16,020 – 32,049	25
6	12,020-16,019	21
4	8,010-12,019	15
3	4,810-8,009	9
2	1,601-4,089	2
1	Less than or equal to 1,600.	10
	Interpretation:	
	Lower	4

Upper Lower	16
Lower Middle	34
Upper Middle	36
Upper	10

BMI interpretation:

	Total no. of students	No. of students suffering dysmenorrhea	Percentage (%)
Underweight	40	37	92.5
Normal	50	46	92
Overweight	7	6	85.7
Obese	3	3	100

6. Discussion

The prevalence of dysmenorrhea in this study was found to be 92%. This result is similar to the result of studies carried out in Tiwan (92.5%) [13], Oman (94%) [14] and Egypt (94%) [15]. However, a difference in the prevalence rates was found in various other studies. Studies carried out in Palestinian female university students and Ethiopia established the prevalence to be 85% and 85.4% respectively [16, 17]. An Indian study found it to be 73.83% [18] whereas, in a study in Bangladesh it was as low as 59.8%.

These varying prevalence rates may be due to the lack of a universally accepted standard definition of dysmenorrhea [19] and also due to the sociocultural differences of the study groups in the pain perception, threshold, lifestyle and age. [20]

An association between age of menarche and dysmenorrhea was identified in this study. 44% of students had their menarche before 14 years and 56% of students had it after 14 years. It is established that early menarche increases the prevalence of dysmenorrhea whereas, late menarche decreases its prevalence. This is supported by the thought that dysmenorrhea is caused by the release of inflammatory factors during menstruation [21] and started after the establishment of ovulatory menstrual cycles [22]. These results are supported by the studies conducted among high school students in Palestinian, Egypt and Mexico. [16, 23, 24]

In this study, a 21% of students reported to have irregular menstrual cycles. There was an association between pattern of menstruation and dysmenorrhea as recorded in other studies in which the people with irregular menstrual patterns suffered more menstrual pain than people with regular menstrual patterns [25]. Also, menstrual irregularity proved to be a strong predictor of dysmenorrhea in a study carried out in Palestinian students [16].

Menstrual bleeding over 5 days is proved to be an important risk factor of dysmenorrhea [26]. In this study, 8% students menstruated for 5-6 days and 6% students menstruated for over 7 days. This finding is supported by a study conducted by MoolRaj Kural et. al. [26].

In this study as 19% of students had a heavy flow and 4% students had a very heavy flow. This is supported by the results obtained from the study conducted in Debremarkos and Mexico. [20, 24]. A possible explanation for this may be

the release of inflammatory factors during menstruation [21]. More studies that showed that having heavy menstrual blood flow had a significant association with primary dysmenorrhea are [27,28,29].

Pain is an extremely subjective symptom and hence, it is very difficult to quantify pain. A Wong- Baker Faces Pain Rating Scale was administered which can be used with all patients aged 3 and above. It was proven useful because some may not understand rating their pain on a scale of 0-10 but they are able to understand the cartoon faces and emotions they present [30]. In the current study, 26% students reported the pain to be mild, 49% students reported it to be moderate and for 17% it was severe.

A Mexican university author concluded that dysmenorrhea was mild in 36% students, moderate in 43.8% and severe in 20.1% [24]. In Ethiopia, 56.9% reported the pain to be moderate to severe and 28.5% people suffered from mild pain. [17]

The possible explanation for the variation is that pain is a highly subjective symptom. The pain perception and expression of pain is influenced by genetics, psychological, developmental, familial, social and cultural factors [30,31,32] as well as stress [33]. Therefore, the aforementioned factors as well as variability of pain threshold of the respondents who participated in all these studies could account for differences in the description of their pain.

The most common site of pain was reported to be the lower abdomen (70%) followed by pain in the lower back (58%) and upper thigh (23%) in this study. In a study carried out in Ethiopia, the most common sites of pain were found to be lower back and lower abdomen which accounted of 88.3% of the results. In the Mexican university students, lower abdominal pain occurred in 93% of the students whereas 43% of students suffered from backache. [17, 24].

An association was found between family and dysmenorrhea in which 69% students had a positive family history and 31% had a negative family history. These results are in accordance with the previous study carried out in Ethiopia, Jeddah, Dammam and Iran [17, 33, 34, 35]. These studies have found correlation between familial predispositions of dysmenorrhea. A possible explanation that some researches have reported is that daughters of mothers who have menstrual complaints also experience menstrual discomfort which is related to behavior that is learned from the mother [26].

In the present study, the problems accompanying dysmenorrhea included fatigue (57.8%), depressed mood (40.96%), headache (39.75%), loss of appetite (33.73%), abdominal bloating (30.12%), nervousness (27.71%), joint pain (21.68%), dizziness (21.68%), cramps (19.27%), breast tenderness (19.27%), insomnia (16.86%), vomiting (13.25%), diarrhea (12.04%), loss of consciousness (10.84%), overeating (8.43%), constipation (2.40%). The most common symptoms are in accordance with other studies i.e. fatigue and nervousness were the most common symptoms associated with dysmenorrhea among Palestinian university students [16], depressed mood is the most

common symptom among the nurses in Saudi Arabia [36], headache is the most commonly associated symptom in a study conducted in Ethiopia [17] and among Thai secondary school students in KhonKaen in which the major symptoms were mood change (84.8%), headache (37.5%), and backache (63.7%) [37].

In this study, 73% students had an effect on performing various activities. The concentration is highly affected (71.23) followed by sports (52.05), daily chores (39.72), test taking skills (23.28), socialization (20.54), decline in grades (20.54). These results are somehow different from other studies in which loss of concentration was reported to be 66.8%, limited sport participation was reported by 37.8% of respondents, test taking skills were declined in 15.4% of the respondents and 31.7% had an effect on socialization [17]. In a study conducted among Thai Secondary School students in KhonKaen, Thailand, loss of concentration was reported among 73.9% students and limited sport participation by 59.8% [37]. In a study conducted among Hispanic female adolescents loss of concentration was reported by 59% respondents, limited sport participation by 37.8% and reduced test taking skills by 36% [38].

In the current study, the rate of absenteeism in school is 50%. This rate is much lower than the rate reported among the students in Ethiopia (80%) [17]. However, school attendance was the least activity affected by menstrual problems reported by only 7.7% of respondents in Egypt [15]. A possible explanation of this too is that pain is an extremely subjective symptom and pain perception depends upon a number of factors such as genetics, psychological, developmental, familial, social and cultural factors as well as stress [30, 31, 32, 33].

78% of the students reported to go through mood changes in the present study. In a study conducted among Thai Secondary School students in KhonKaen, Thailand, 84% of students go through mood changes during menstruation whereas another study conducted in Ethiopia stated the mood changes to be 57.8% [37, 17]. A possible explanation for this may be the rise of hormones, specifically estrogen throughout the menstrual cycle. Estrogen levels begin to rise slowly just after a woman's periods end and it peaks 2 weeks later. These hormonal peaks and valleys are thought to cause mood swings.

In this study, pain is managed primarily by taking rest (72.65%), followed by distraction (30.43%), non-prescribed medications (19.56), prescribed medications (14.13), tea (13.04%), foodstuffs (10.86%), heating pad (9.78%), herbs (2.17%) and exercise (1.08%). It is seen that most women do not opt for medications. The possible reason for this may be that most women consider dysmenorrhea as a natural phenomenon. In an Indian study a small proportion of students sought pharmacological management of pain while majority used herbal/ non-pharmacological approaches to reduce pain [39]. In this study, we have sought different non-pharmacological methods used to reduce pain whereas most studies speak about the pharmacological management of pain.

In the current study, 13% of people seek help from a doctor or a nurse for dysmenorrhea or other menstrual symptoms. In a study conducted in Ghana, the rate of hospital visit was 16.3%. [19]

We have studied the nutritional habits of the students included in this study and it shows that 25% students have sweet and sugary beverages in high proportions. The potential explanation for this may be that vitamins and mineral absorption and metabolism are compromised by excessive sugar intake. This leads to muscle spasm, which is manifested by menstrual pain. This result is in accordance with the results found in Ethiopia and Turkish university students in which dysmenorrhea was higher in women with excessive intake of Coco-cola/ Pepsi. [17, 40]

In the current study, it is found that 70% of students have breakfast regularly and 30% of students do not have breakfast at all. Breakfast is the strongest predictor of intensity of dysmenorrhea pain. The relationship between breakfast and intensity of pain has been discussed by an article published in Japan where authors found out that students who skipped breakfast have a higher intensity of dysmenorrhea pain. [41]

A relationship between consumption of tea/ coffee and dysmenorrhea has been established in this study. 53% of respondents in this study consumed tea/coffee on a regular basis and 29% consumed it occasionally. This is in accordance with the results established in Debremarkos Berhan University students in Ethiopia [11]. A potential explanation for this is that food items rich in sugar may contain the precursors of prostaglandins which are presumed to be the cause of dysmenorrhea [11]. This was also established in a study conducted in Ethiopia and Turkish University Students [17,40]

In this study, a significant association was observed between physical activity and dysmenorrhea as very few people exercise regularly (11%). Physical activity was found to have a significant association with the occurrence of dysmenorrhea in the Debremarkos Berhan University students in Ethiopia [11] in which they found out that carrying out physical activity decreased the prevalence of dysmenorrhea. Similar results were also found in a study conducted in Iran [35].

No significant relationship was established between alcoholism or smoking and the intensity of pain during dysmenorrhea as only 1% of the respondents consumed alcohol or cigarettes daily. The results from a study conducted in Jeddah, Saudi Arabia showed that prevalence of dysmenorrhea is higher among smokers compared to non-smokers. This agrees with the study from Dammam in Saudi Arabia [33, 34]. On the contrary, no significant relationship between alcoholism or smoking was observed in the results from a study in Turkey [40].

Stress was found to be one of the most important predictors of dysmenorrhea in the current study. 81% of the students were under stress. These results are in accordance with the results found in studies in Tiwan, Jeddah and Iran [14, 33, 35]. Several studies give an explanation for this association by relating stress with the cascade of neuro-endocrinal

responses [33]. Dorn et al. [35] reported that emotional disturbances may cause menstrual cycle abnormalities especially dysmenorrhea which agrees with our results.

In this study, according to Modified Kuppuswami Scale-2012, 4% students belonged to lower class, 16% to upper lower, 34% to lower middle, 36% to upper middle and 10% to upper class. As we can see that most of the students belonged to lower socio-economic background, the lifestyle can also be a predictor of dysmenorrhea. This is in accordance with a study carried out in Goa which concluded that participants who had a relatively deprived socio-economic status (migrants, illiterate, facing economic difficulties) were at greater risk to complain of moderate–severe dysmenorrhea.

In the current study, 40 students were underweight out of which 92.5% students suffered from dysmenorrhea. Many studies revealed that having low BMI is an important risk factor for primary dysmenorrhea. [28, 29, 43]. A possible explanation for this may be lack of nutrition and poor lifestyle which has proven to be potential risk factors of dysmenorrhea.

7. Conclusion

It has been established that there is a very high prevalence of dysmenorrhea among the adolescent girls in rural Maharashtra, India.

The severity of pain experienced and the techniques used to alleviate the pain is varied amongst the population.

The most common predisposing factors are found to be early age at menarche, family history, consumption of tea / coffee, exercising habits, stress and lifestyle.

It is found that having a low BMI is one of the strongest predictor of dysmenorrhea.

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