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‘Menstrual characteristics’ and ‘prevalence and effects of dysmenorrhea’ on quality of life of medical students

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ABSTRACT

Background: A common gynecological problem encountered among female medical students is dysmenorrhea, which also appears to be a leading cause of absenteeism from college. Hence arises a need to evaluate the menstrual characteristics, prevalence of dysmenorrhoea and its effect on daily routine activities and quality of life of medical students.

Aims: This is a cross sectional descriptive study, conducted on 560 female medical students with the objectives to evaluate the menstrual characteristics, prevalence and severity of dysmenorrhoea and its effects on the quality of life, particularly absenteeism from college.

Methods: Three medical colleges in Mangalore (Karnataka, India) provided the setting of our study. These were representative of a cosmopolitan nature of the study population. A total of 560 students were interviewed by the investigators. All participants were given a preformed questionnaire to complete. Besides menstrual characteristics the questionnaire included gradation of pain and quality of life based on the American Chronic Pain Association (ACPA) which was modified according to needs of our study. Chi-square test and logistic regression were used for statistical analyses.

Results: The average age of the participants was 20.57 years +/- 1.208 years (ranging from 17-24 years). The mean BMI of the participants was 21.69 +/- 3.27 kg/m² (ranging from 14.7 kg/m² to 33.54kg/m²). The average age of menarche was 12.67 +/- 1.10 years, (9 to 16 years). The average menstrual cycle duration of the participants in the study group was 29.52 +/- 3.37 days. 97.2 % (533), family history of dysmenorrhea was present in 40% participants (n=560). Of the total, 86.96 % (487) participants reported to have physical premenstrual symptoms and 55.71% (312) reported to have psychological premenstrual symptom. There is a significant association between Quality of Life and severity of dysmenorrhea.

Conclusion: Our study shows a significant association of dysmenorrhoea with the age of menarche, family history and both physical and psychological premenstrual symptoms. Although there was an association of dysmenorrhoea with chronological age, BMI and cycle length, these associations were not found to be statistically significant. The most significant conclusion of our study was found to be high prevalence of dysmenorrhoea, having a significant effect on the routine activities and a detrimental effect on the quality of life. The alarming prevalence of self-medication in the form of NSAID's, easily available over the counter was also highlighted in our study.

Keywords: Dysmenorrhoea, Menstrual characteristics, Quality of life

Introduction

Dysmenorrhoea is defined as painful menstrual cramps of uterine origin. It is common gynecological condition that can affect as many as 50% of women¹. 10% of these women suffer severely enough to render them incapacitated for one to three days each menstrual cycle². This situation not only has a significant effect on quality of life and personal health but also has a global economic impact³.

Two categories of dysmenorrhoea are defined, primary and secondary.

Primary is a menstrual pain without any organic pathology⁴. The initial onset of primary dysmenorrhoea is usually at or shortly after menarche, when ovulatory cycles are established.

When the pelvic pain is associated with an identifiable pathological condition, such as endometriosis, ovarian cysts, pelvic inflammation, myomas or intrauterine

devices it is considered to be secondary dysmenorrhoea. This category is more likely to occur years after the onset of menarche and can occur premenstrually as well as during menstruation.

As described above, dysmenorrhoea with an identifiable cause is termed as secondary, where as one without any identifiable cause are primary. In vivo and in vitro research has identified the over-production of prostaglandins as a substantial contributing factor to the painful cramps.⁵

Several longitudinal studies have found a positive association of primary dysmenorrhea with duration of menstrual flow, younger age at menarche, increased BMI and cigarette smoking.^{6, 7} There is also some evidence of a dose-response relationship between exposure to environmental tobacco smoke and increased incidence of dysmenorrhoea⁷. Childbirth, in contrast, appears to relieve dysmenorrhoea⁶.

AIM

This is a cross sectional descriptive study, conducted on 560 female medical students with the objectives to evaluate the menstrual characteristics, prevalence and severity of dysmenorrhoea and its effect on the quality of life, particularly absenteeism from college.

Methods

Setting

Mangalore is a city situated in the state of Karnataka in South India. It has a population of 484,785 as per the 2011 [census](#) of India⁸. There are significant disparities in the socio-economic characteristics in the different quarters of the city. The city includes several universities and professional colleges and has a cosmopolitan structure in terms of student population. This study was conducted in Father Muller Medical College, Yenнопoya Medical College, and Kasturba Medical College, Mangalore.

Sampling

This cross-sectional study was conducted between March 2011 and October 2011. A total of about 600 subjects were accessible, out of which 560 agreed to be a part of the study, others were either absent or refused to fill the questionnaire.

The 'quality of life' scale, devised by American Chronic Pain Association was modified as per the activities most suited for the college students most commonly limited to attending classes and mild to moderate form of exercise.

Procedure

All 560 participants surveyed at colleges completed the questionnaires and inventories during a class period. After distributing the questionnaires to students at the college, they were informed as to how the questionnaires were to be filled and were then requested to make the best choice that was applicable to them during past 1 year. The participants completed questionnaires in the presence of a member of the research team. All participants 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. The duration for completing the questionnaire was between 15-20 min per participant. The principal investigator checked the data to ensure its quality.

Development of Questionnaires

Dysmenorrhoea was said to be present if the participant reported pain in the abdomen on the day before and /or the first day of the menstrual period.

The participants were provided with a visual analogue scale of 0-4, to assess their pain. (where zero referred to least intensity of pain and 4 referred to pain severe enough to confine a participant to home / bed)

(Original scale- APPENDIX I)

MODIFICATION OF QUALITY OF LIFE SCALE

ORIGINAL SCALE	MODIFIED AS SUITABLE FOR THE STUDY
0-2	0
3-4	1

5-7	2
8-9	3
10	4

If the participant experienced menstrual bleeding in equal intervals between 21 and 35 days, it was evaluated as normal ⁹; if the menstruation interval was less than 21 days, it was considered to be short; if the menstruation interval was more than 35 days, it was considered to be long.

The presence of dysmenorrhea in an adolescent's mother or sister was accepted as a positive family history of dysmenorrhea.

BMI were calculated by measuring their height and weight. Each participant's body weight was measured with domestic scales and height with a meter rule. As per the "WHO The International Classification of adult underweight, overweight and obesity according to BMI", those who had a BMI of 18.0–24.9 kg/m² were classified as normal weight, participants with BMI values that corresponded to a BMI of 25.0–29.9 kg/m² were classified as overweight (pre-obese), participants with BMI values that corresponded to an adult BMI of 30.0 kg/m² were classified as

obese, and with BMI values that corresponded to <18.0 kg/m² as underweight ¹⁰.

Frequently, women of reproductive age experience symptoms during late luteal phase of their menstrual cycle, and collectively these complaints are termed premenstrual symptoms, and typically include both psychological and physical symptoms ¹¹.

Physical symptoms were broadly divided into abdominal symptoms (abdominal bloating, hypogastric pain), breast symptoms (breast heaviness/tenderness) and other symptoms (headache, pain in thighs, backache).

Psychological symptoms, on the other hand, were classified as uneasiness, anxiety and disturbed sleep.

Ethical approval was taken from the hospital's ethics committee.

Statistical methods:

Chi-square test and logistic regression were used for statistical analyses.

Results

Baseline characteristics (Figure 1, 2)

The average age of the participants was 20.57 years +/- 1.208 years (ranging from 17-24 years). 23% (114) were found to be less than 20 years of age whereas only 4% (22) were above 22 years of age. Most of the responders, 73% (409) fell within the age group of 20-22.

The mean BMI of the participants was 21.69 +/- 3.27 kg/m² (ranging from 14.7 kg/m² to 33.54 kg/m²).

Majority of the participants had a normal BMI (18.5-25) which was around 67% of the total participants. The underweight and overweight categories had almost equal distribution with 15% were and 18% respectively.

Menstrual Characteristics

The prevalence of dysmenorrhea was very high with 67.5% (378) with around 34% of the women who experienced pain rating their pain as 'slightly severe'.

Age of Menarche (Figure 3, table 1)

The average age of menarche was 12.67 +/- 1.10 years, (9 to 16 years). Most of the participants, i.e. 84.2% (472), had started menstruating between 12-14 years of age.

Association with dysmenorrhoea

There is a significant association between age of menarche and dysmenorrhea ($\chi^2 = 11.36$ df= 2 and p value =0.003). After taking the age group of 12-14 years as the reference category the bivariate analysis found that girls who had menarche at 15 years and above had a 30% higher chance of reporting dysmenorrhea when compared

to girls who had menarche at 12-14 years and the difference was found to be statistically significant (RR: 1.30 ; 95% CI: 1.06-1.60). Similarly we also found that girls who had menarche at 11 years or below had a 23% higher chance of reporting dysmenorrhea when compared to girls who had menarche at the reference age group and this difference was also found to be statistically significant (R.R :1.23; 95% CI; 1.13-1.45).

Length of the menstrual cycle

Among the 548 respondents the average duration of the menstrual cycle was 29.52 +/- 3.37 days (20-45 days). A large chunk of students had menstrual cycle duration of 28 to 35 days; 97.2% (533), which is considered as normal. Since a very small number (2.8%) had cycle length <21 days and >35 days, we did not endeavor to find any association between cycle length and dysmenorrhea.

Family History (Figure 4,5, table 2)

Most of the interviewees did not have complaints of dysmenorrhea among their immediate family members; 60.5% (339).

Association with dysmenorrhoea

Of the 39.5% (221) participants who had some family history of dysmenorrhoea, 81.9% (181) experiences the condition themselves. The bivariate analysis performed proved to be statistically significant ($\chi^2 = 34.5$ df=1 and p value =0.000). Thus we concluded that participants whose family members (sisters or mothers) had a history of dysmenorrhoea had a 1.41 times greater chance of having the same problem when compared to participants without a family history of the same (RR: 1.41; 95% CI =1.26 -1.57).

Premenstrual Symptoms

As per our methodology, premenstrual symptoms were classified as physical and psychological (while considering the percentages, please note there are participants who have reported both physical and psychological symptoms)

- *PMS - PHYSICAL SYMPTOMS* (Figure 6, table 3)

Of the total 560, 86.96% (487) participants reported to have physical premenstrual symptoms. These were broadly classified into abdominal symptoms (abdominal pain, bloating), breast heaviness, and other symptoms (headache, backache, pain in thighs). Abdominal symptoms were reported by 67.9% (380) while breast heaviness was reported by only 21.1% (118) of the women.

Association with dysmenorrhoea

Our analysis showed an association between PMS (physical) and dysmenorrhea ($\chi^2 = 167.34$ $df=1$ and p value = 0.000). We found that women who had PMS had 56.1 times more chance of having dysmenorrhea when compared to women in whom PMS was absent and the difference was found to be statistically significant (RR 56.51, 95% CI= 8.06 TO 396.06). The nature of the result is due to the obvious fact that most responders (except one) that had dysmenorrhea experienced some form of PMS.

- *PMS - PSYCHOLOGICAL SYMPTOMS* (Figure 7)

44% (245) of the 557 participants did not report any psychological symptoms (3 responses could not be analyzed) but a majority, 56% (312) of the surveyed women reported to have experienced some form of psychological premenstrual symptom. Out of these, 46% (146) of the subjects had experienced uneasiness

whereas 42% (131) reported anxiety as the main problem.

Association with dysmenorrhoea

As a standard procedure, women who did not experience any form of PMS (psychological) were taken as the reference category and other categories of the problem were compared to this.

Our results were as follows: women who experienced uneasiness were 1.75 times more likely to have dysmenorrhea when compared to women who had no PMS and the difference was statistically significant (RR:1.75,95% CI:1.48-2.07). Women who experienced anxiety were 2.17 times more likely to have dysmenorrhea when compared to women who had no PMS and the difference was statistically significant (RR: 2.17, 95%CI: 1.88-2.52). Women who had disturbed sleep as their main PMS were 2.3 times more likely to have dysmenorrhea when compared to women who had no PMS and this too was statistically significant (RR: 2.30, 95% CI:1.99-2.65).

Treatment (any) and Dysmenorrhea (Figure 8, table 4)

- 86.9% (320/368) of women who had dysmenorrhea took treatment. Among these
 - 73.4% (270/368) women took allopathic medicines: (168/270 took Analgesics, 148/270 took Antispasmodics and 46/270 took both).
 - 57.8% (213/368) women took Physiotherapy. (91 % (194/213) used hot water bag)
 - 39.94% (147/368) women took both Allopathic and Physiotherapy treatment.

- 19.83% (73/368) women made use of home remedies
- 6.79% (25/368) women made use of other means

Quality of Life and Dysmenorrhoea (Figure 9, table 5)

Again in this bivariate analysis ‘normal’ QOL (376; 67.1%) was taken as the reference category and all other analysis was done with respect to this; participants who had dysmenorrhea were 6.6 times more likely to stay in bed all day when compared to women who had normal quality of life with respect to their menstrual cycle and the difference was found to be statistically significant (RR: 6.6, 95% CI:4.48 to 8.45). We also found that participants who had dysmenorrhea were 6.16 times more likely to stay at home all day when compared to women who had normal quality of life with respect to their menstrual cycle and the difference was found to be statistically significant (RR :6.16, 95% CI:4.48 to 8.45). In addition to this participants who had dysmenorrhea were 6.06 times more likely to attend college after taking medication (with no other outdoor activities) when compared to women who had normal quality of life with respect to their menstrual cycle and the difference was found to be statistically significant (RR:6.06, 95% CI :4.41 to 8.34). Lastly, we found that participants who had dysmenorrhea were 5.62 times more likely attend college without taking medication (with no other outdoor activities) when compared to women who had normal quality of life with respect to their menstrual cycle and the difference was found to be statistically significant (RR: 5.62, 95% CI:4.08 to 7.75).

Logistic Regression;

According to the bivariate analysis, significant differences were revealed between the existence of dysmenorrhea and age of menarche, family history, different grades of PMS (psychological) and the presence of PMS (physical) among women in the study population. Logistic regression was performed using ‘Enter method’ for the above mentioned variable, the results are as given in the table below.

Age at menarche (15 years and above, 11 years and below), presence of dysmenorrhea in the immediate family, presence of PMS (uneasiness and anxiety) and the presence of physical Premenstrual Syndrome (PMS) were considered to be important risk factors for dysmenorrhoea in the study population. However, the last category of PMDD (disturbed sleep) was found not to be a precipitating factor for dysmenorrhoea. This might be due to the comparatively less number of participants who reported this as one of their problems.

The presence dysmenorrhoea seemed to be an important factor in determining the different subcategories of the quality of life as well as the need to take any form of treatment, in the bivariate analysis. However, because these variables were considered to be the effects rather than the causes of dysmenorrhoea they were analyzed separately using logistic regression and were not combined with the other variables. Attending college with or without medications (without any outdoor activities) were the only variables among all the sub categories of the Quality of Life that were significantly associated with dysmenorrhea. The wide confidence intervals were due to the low and unequal respondents in these categories. Both the sub categories: “in bed all day” and “unable to attend college” were not associated with dysmenorrhoea, this might be again due to the comparatively unequal

distribution of respondents in these two categories. Seeking treatment (in any form) was also independently associated with dysmenorrhoea.

Discussion

Dysmenorrhoea is the most common gynecological problem worldwide. In our study, 67.5% of girls reported dysmenorrhoea in past 1 year. Other studies conducted in the developing countries reported a prevalence ranging from 71% to 75%^(12, 13, and 14). A Cochrane systematic review of studies in developing countries reported prevalence of dysmenorrhoea in 25% to 50% of adult women.⁽¹⁵⁾ On the other hand, studies from the developed world reports a wide range of 60% to 73%^(16, 17, 18)

The prevalence of dysmenorrhoea varies with age of menarche.

The students' average menarche age was 12.67 \pm 1.10 years. Of the total participants found to have dysmenorrhoea, 82.69% of the participants had attained menarche by the age of 11 (early menarche). There is a significant association between early age of menarche and dysmenorrhoea, ($p=0.003$). Participants who had menarche at 11 yrs and below, had a 23% higher chance of having dysmenorrhoea when compared to participants who had menarche at an age above 11 yrs and the difference was found to be statistically significant. This finding is found consistent with several other studies^(12, 19,20). However, none of these references give an explanation for the same. This could probably be explained by the fact that girls who attain menarche early have longer exposure to uterine prostaglandins, leading to higher prevalence of dysmenorrhoea.

Variation in prevalence of dysmenorrhoea and BMI

The mean BMI of the students was 21.69 \pm 3.27 kg/m² (ranging from 14.7 to 33.54). 67.1% of the women had a normal BMI, which falls between 29.5 to 25 kg/m². Although not significantly associated, it was found that participants who were underweight were 0.002 times less likely, whereas those overweight and obese are more likely to suffer from dysmenorrhoea when compared to participants with normal BMI. Another study conducted in India, under similar set up, finds no correlation between BMI and dysmenorrhoea¹⁴. Similarly, no association was found between prevalence of dysmenorrhoea and height or weight²¹. Our findings were consistent with those reported in the literature, i.e. severity of dysmenorrhoea is positively associated with increased BMI.²⁰

Length of cycle

The average menstrual cycle duration of the students in the study group was 29.52 \pm 3.37 days. 97.2%, (533), of the subjects have a normal cycle length of around 20-35 days. Normal length of cycle is considered 21-35 days long²². This is in view of fact that the cycles are already regularized by this age. We did not find the association between length of cycle and dysmenorrhoea. Different studies suggest that dysmenorrhoea is more prevalent in women with longer cycles.^(13, 23)

Premenstrual symptoms

Frequently, women of reproductive age experience symptoms during late luteal

phase of their menstrual cycle, and collectively these complaints are termed premenstrual symptoms and typically include both psychiatric and physical symptoms.¹¹ Our study reports a significant association between the premenstrual symptoms (both physical and psychological) and dysmenorrhoea. We cannot say if the anticipation of dysmenorrhoea might be the reason of the premenstrual symptoms or the psychological symptoms like anxiety and disturbed sleep, which may also decrease the pain threshold, might be responsible for increased severity of dysmenorrhoea. The findings are consistent with other study¹² where the symptoms associated with dysmenorrhoea are graded as lethargy and tiredness (first), depression (second) and inability to concentrate in work (third).

In another study from India,⁽¹⁴⁾ subjects suffering from dysmenorrhoea (n=79), presented with following symptoms i.e., backache (62.0%), headache (26.58%), fatigue (70.88%) and vomiting/diarrhea (6.32%) were reported. In 107 participants, 60.74% were presented with PMS, symptoms consist of: breast heaviness (17.75%), abdominal bloating (12.14%), backache (25.23%), headache (13.08%), uneasiness (22.42%), and anxiety (8.41%).

The most frequent symptoms associated with dysmenorrhoea were fatigue, headache, backache, dizziness and anorexia/vomiting. In 23.8% of cases there were no associated symptoms¹³

Familial correlation

In this study it was found that 39.46% participants have a positive familial correlation, i.e. either mother or sibling has similar complaints. This is in accordance to other similar study conducted in similar setup in Pakistan²⁴. Another study finds a strong correlation

between familial predisposition and dysmenorrhoea.¹⁸

Effect on daily routine

Dysmenorrhea is found to have significant effect on day to day activities, limiting daily activities⁽¹³⁾ having negative effect on quality of life¹⁸, leading to absenteeism in work place or taking medication to carry out daily activities^(14,21). Similar findings appear in our study, most of the participants, most commonly limited to attending classes and mild to moderate form of exercise.

Treatment

86.9% (320/368) of the participants who had dysmenorrhoea took treatment.

Where most (91%=194/213) common mode of treatment was evaluated to be the application of heat in the form of hot water bag, a large number of participants (73.4%) relied on easily available over the counter analgesics. These drugs (NSAIDs) have considerable side effect and its effluent use needs to be checked.

Conclusion

Dysmenorrhoea is found to be highly prevalent among female medical students and is found to be a leading cause of absenteeism in medical colleges. A positive association between dysmenorrhoea and the age of menarche, family history, both physical and psychological premenstrual symptoms. Although there was an association of dysmenorrhoea with chronological age, BMI and cycle length, these associations were not found to be statistically significant.

Most women experience a number of physical and emotional symptoms associated with dysmenorrhea.

Dysmenorrhoea is also found to have an adverse effect on the quality of life.

Conflict of interest: none

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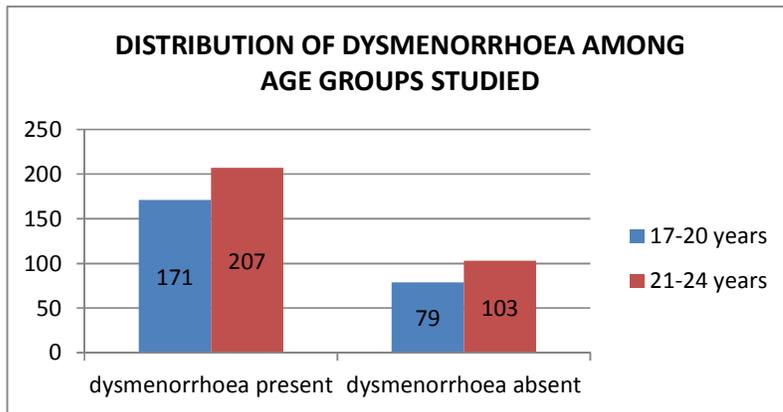
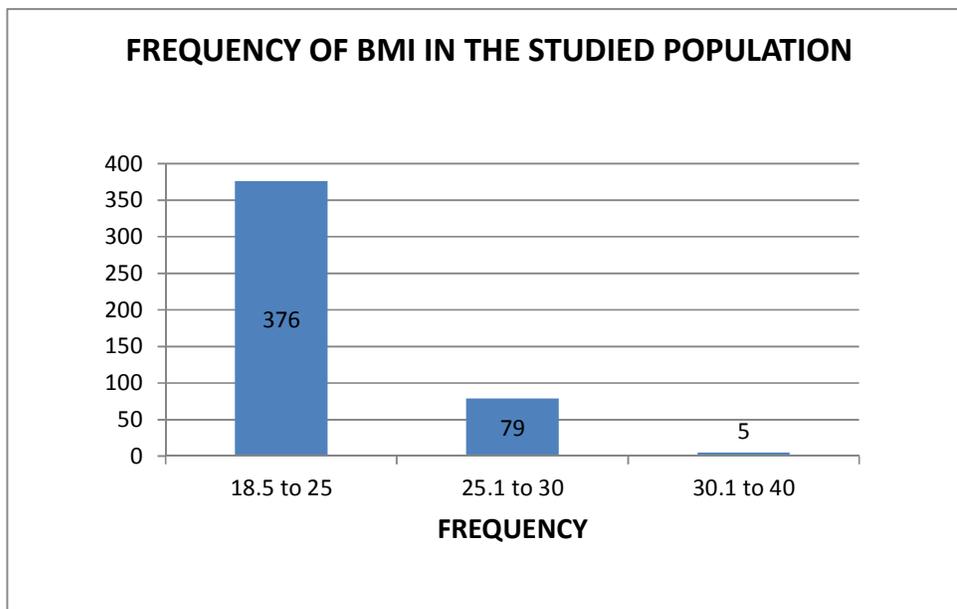
TABLES AND FIGURES**FIGURE: 1****FIGURE: 2**

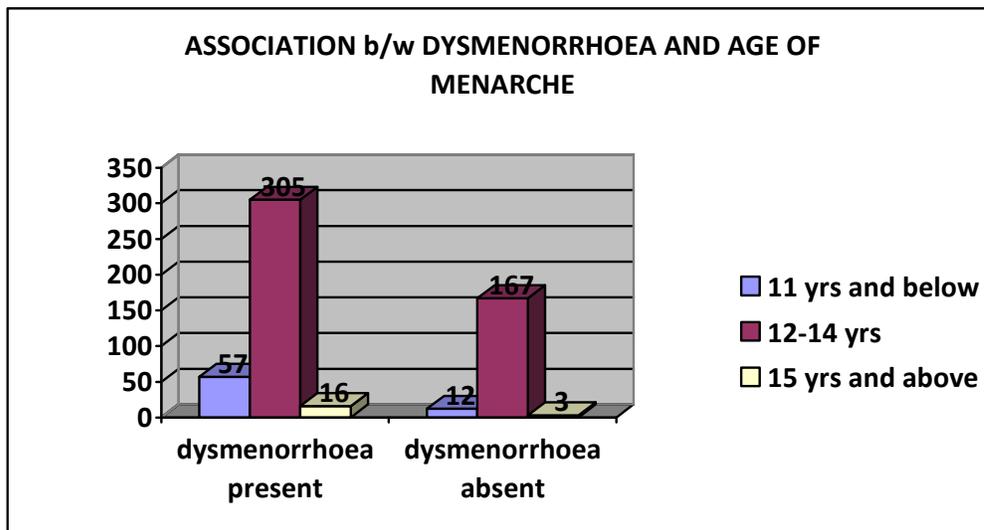
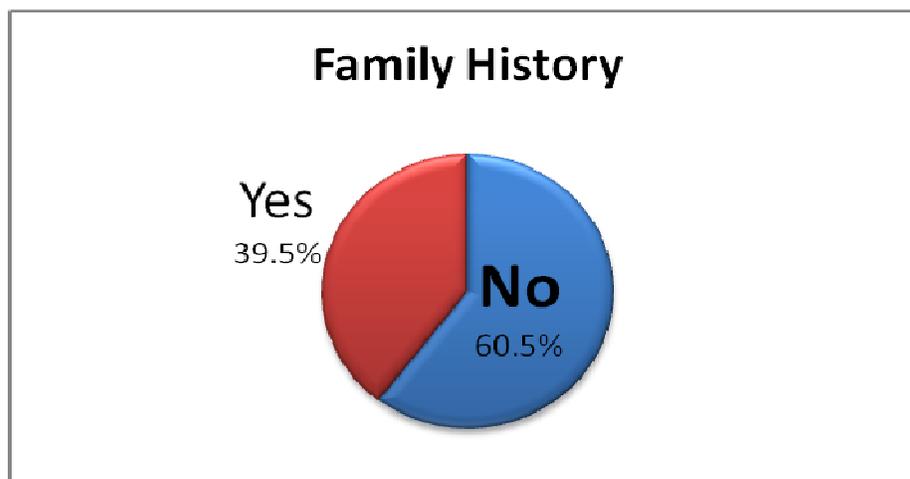
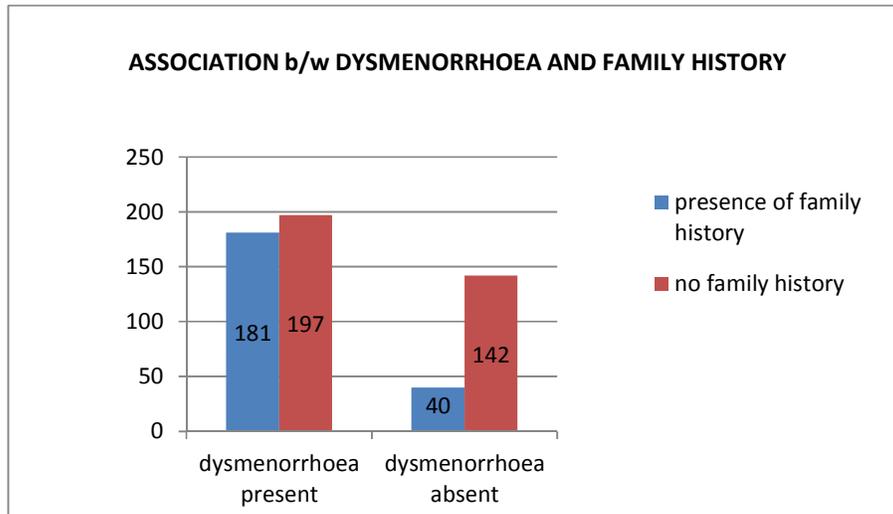
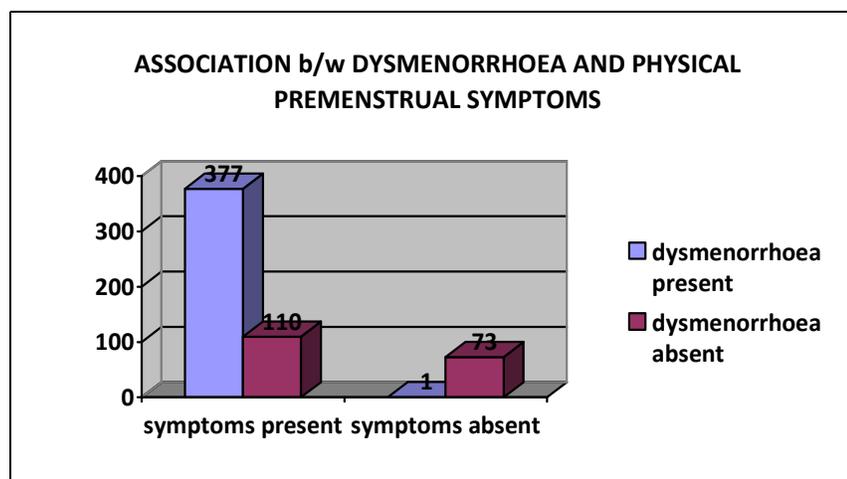
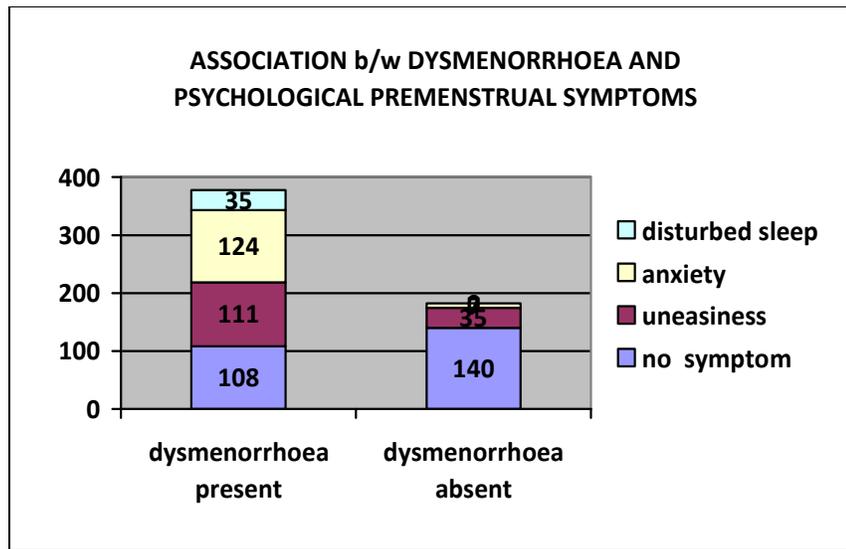
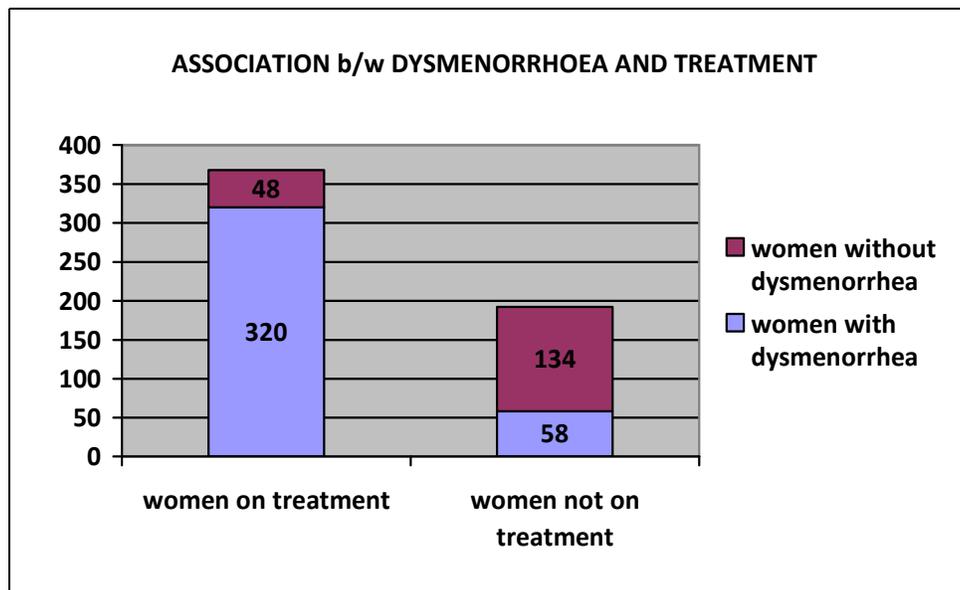
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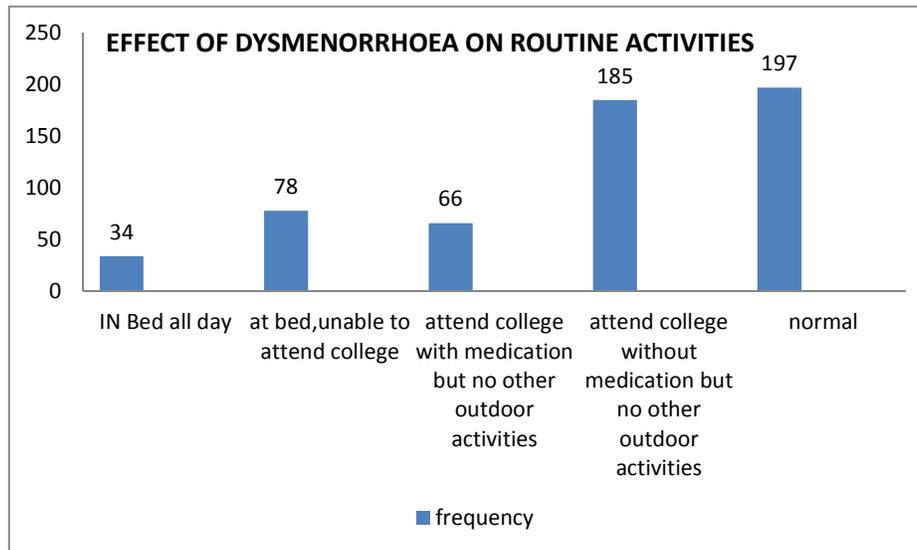


TABLE: 1 ASSOCIATION b/w AGE OF MENARCHE AND DYSMENORRHOEA

Age of Menarche	Dysmenorrhea		Total	RR (95% (CI))
	Yes	No		
12-14 years	305	167	472	1
15 years and above	16	3	19	1.30 (1.06-1.60)
11 years and below	57	12	69	1.23 (1.13-1.45)
Total	378	182	560	

$\chi^2 = 11.36$ df=2 and p value =0.003

There is a significant association between Age of Menarche and Dysmenorrhea

TABLE: 2 ASSOCIATION between FAMILY HISTORY AND DYSMENORRHOEA

Family History of Dysmenorrhoea	Dysmenorrhea		Total
	Yes	No	
Presence of Family History	181	40	221
No Family History	197	142	339
Total	378	182	560

$\chi^2 = 34.5$ df=1 and p value =0.000

TABLE: 3 ASSOCIATION b/w PHYSICAL PREMENSTRUAL SYMPTOMS AND DYSMENORRHOEA

Premenstrual Syndrome	Dysmenorrhea		Total
	Yes	No	
Present	377	110	487
Absent	1	72	73
Total	378	182	560

Relative Risk = 56.51, 95% CI= 8.06 TO 396.06

$\chi^2 = 167.34$ df=1 and p value =0.000

TABLE: 4 ASSOCIATION b/w TREATMENT(ANY) AND DYSMENORRHOEA

Treatment	Dysmenorrhea		Total
	Yes	No	
Yes	320	48	368
No	58	134	192
Total	378	182	560

Relative Risk =2.88, 95% CI= 2.31 to 3.58 $\chi^2 = 185.22$ df=1 and p value =0.000

TABLE: 5 EFFECT OF DYSMENORRHOEA ON QUALITY OF LIFE AND SEVERITY OF PAIN

Quality of Life and Severity of Dysmenorrhoea (grades of pain)						
Quality of Life		Severity of Dysmenorrhoea (grades of pain)				
		Severe	Slightly Severe	Moderate	Mild	None
	In bed all day	33	1	0	0	0
	Unable to attend college	33	45	0	0	0
	Attend college with medications but no other outdoor activities	6	58	2	0	0
	Attend college without medications but no other outdoor activities	6	25	105	33	16
	Normal	3	0	0	25	169
Total		185	58	107	129	81

$\chi^2 = 955$ df=16 and p value =0.000

(APPENDIX – I)

ORIGINAL SCALE

- 0- Stay in bed all day. Feel hopeless and helpless about life.
- 1- Stay in bed at least half the day. Have no contact with outside world.
- 2- Get out of bed but don't get dressed .Stay at home all day.
- 3- Get dressed in the morning. Minimal activities at home. Contact with friends via phone, email.
- 4- Do simple chores around the house. Minimal activities outside of home two days a week.
- 5- Struggle but fulfil daily home responsibilities. No outside activity. Not able to work/volunteer.
- 6- Work/volunteer limited hours. Take part in limited social activities on weekends.
- 7- Work/volunteer for a few hours daily. Can be active at least five hours a day. Can make plans to do simple activities on weekends.
- 8- Work/volunteer for at least six hours daily. Have energy to make plans for one evening social activity during the week. Active on weekends.
- 9- Work/volunteer/be active eight hours daily. Take part in family life. Outside social activities limited.
- 10- Go to work/volunteer each day. Normal daily activities each day. Have a social life outside of work. Take an active part in family life.