Menstrual Disorders from Puberty to Early Adult Age: A Cross-Sectional Survey

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ABSTRACT

Introduction: A female encounters various menstrual disorders from puberty to menopause. We evaluated menstrual disturbances in post-menarche age and young adult age.

Aim: To know the prevalence and impact of menstrual abnormalities at early adolescent and young adult age and to evaluate course of disorders identified at early adolescent age.

Materials and Methods: A cross-sectional survey was carried out through self-administered questionnaire on 367 consented students at Melaka Manipal Medical College at Manipal, during December 2015- April 2016. Data were analysed by Statistical Package for the Social Sciences (SPSS) 16.0 software.

Results: Prevalence and pattern of menstrual disorders at early adolescent and at young adult age were noted. The mean age of menarche was 12.1 ±1.1 years. Menorrhagia was the most frequent (14.7% and 11.7%) and polymenorrhea (7.6 % and 6%)

was least frequent menstrual disorder at adolescent age and young adult age respectively. Resolution of pubertal menstrual disorders was observed in all disorders, but noticed highest in oligomenorrhea (91%), (p-value <0.05). Prevalence of menstrual related disorder like dysmenorrhea was 88.7% at adolescent age and 67.6% at the young adult age. It was statistically significant reduction. Hindrance in academic performance and social behavior was noted more at young adult age, which was in 23.9% and 46.7% respectively (p-value <0.05).

Conclusion: The most prevalent menstrual abnormality was menorrhagia at the early adolescent and the young adult age. Associated the most prevalent menstrual related symptoms were dysmenorrhea at early adolescent age, and premenstrual symptom at the young adult age. The study demonstrates the natural course (decreasing prevalence) of all menstrual disorders from early adolescent to young adult age.

Keywords: Adolescent, Dysmenorrhoea, Menorrhagia, Menstrual irregularities, Oligomenorrhea, Young adult age

INTRODUCTION

Menstrual abnormalities that the female encounters from menarche to menopause are prolonged menstrual bleeding, menstrual cycle length variability, secondary amenorrhea and inter-menstrual bleeding. Other menstruation related disorders are dysmenorrhea and premenstrual syndrome. Nearly every woman experiences one or more of these abnormalities in her lifetime [1]. It is reported that 75% of girls experience some problems associated with menstruation by the late adolescent age [2].

Several studies have reported prevalence and pattern of menstrual disorders in university students [3, 4] and school girls [5,6]. No study so far has explored the longitudinal information on menstrual abnormality from post-menarche age to young adult age as majority of menstrual disorders at post-menarche are transitional. Here, different menstrual disorders are evaluated in context to resolution and persistence of the condition after menarche. As menstrual abnormalities have an impact on physical and psychological health, quality of life and social integration at any age. It is reciprocated as absentees in the classes, interference with sport and exercise, diminished work output and disturbed relationship with family, friends, and boyfriends in students [7, 8]. The rationale of this study was to understand the natural history of various menstrual disorders noticed at post-menarche, which will help in counseling and management of adolescents with similar complaints. Therefore the study was conducted to know the prevalence and impact of menstrual abnormality at post-menarche and young adult age and to evaluate the course of disorders identified at the post-menarche period.

MATERIALS AND METHODS

A cross-sectional, questionnaire-based, observational study was conducted at Melaka Manipal Medical College, Manipal university

campus during December 2015-April 2016. The study was approved by Manipal University ethical committee, Manipal. All the participants were residents of Malaysia, with the native of East Malaysia, India, Srilanka and China. Students were from eleven states and two federal territories located on the Malay Peninsula. At 95% confidence level, 0.5% standard deviation and a margin of error of 5%, sample size calculated were 385.

The study was conducted among four hundred students of the 1st, 2nd and 3rd year of the medical and dental branch, aged between 18-24 years. Written informed consent was obtained after a briefing of the study. We included all the students without known organic pathology of the reproductive tract and willing to participate. The students with no apparent health issues were included. The questionnaire was in the English language for data collection. It was checked by three gynecologists for its validity, and changes were made in two questions. It was tested on ten students for its acceptability before its final distribution among students. Soft copy and hard copy of questionnaires were distributed after the university class. Thoroughly answered questionnaire was taken for analysis. The questionnaire was divided into 3 sections, each having 12 questions. The first part of the questionnaire designed to obtain socio-demographic and lifestyle information. Data were on height, weight, diet; birth weight, alcohol and tobacco consumption, and exercise. The second part had the questionnaire on the understanding of puberty and immediate post-menarche menstrual cycles for the period of 2 years. The third section was about current menstrual cycle information (past 6 months). Answers were the mixture of multiple choice and text. The study was conducted by two researchers on site, who addressed their queries and guided for existed problems after the university classes. Anonymity and confidentiality were maintained. The participants were informed about their right to withdraw from the study at any time.

Socioeconomic strata were decided by per-capita income per month. Less than 3000RM (Ringgits Malaysia), 3001-7000RM and 7000RM onwards are categorized arbitrarily as low, middle and high socio-economic class in our study [9]. We have considered postmenarche age as between 9-15 years and early adult age as 18-24 years. We defined dysmenorrheal (pain during menstruation), menorrhagia (bleeding >7 days), hypomenorrhea (bleeding<3 days), oligomenorrhea (cycle length of >35 days), polymenorrhea (cycle length of <21 days) [10]. The dysmenorrhea was divided into mild, moderate and severe category according to Wong baker face rating scale [11]. We have defined scanty bleeding as usage of <2 sanitary napkins/day and heavy bleeding as >6 sanitary napkins/day, which was subjective. For adolescents, oligomenorrhea was defined as cycle length of more than 45 days [12]. Cycle interval between21-35 days (21-45 days for post-menarche group) and duration of 3-7 days were taken as normal menstrual interval and duration. Premenstrual syndrome was defined as a spectrum of physical and psychological symptoms (e.g., fatigue, irritability, breast tenderness, mood lability, headache, anxiety, change in appetite, food craving, and hypersomnia) occurring in a premenstrual phase cyclically [13]. We have taken the presence of atleast 2 symptoms for enrollment in premenstrual syndrome. Constellation of psychological symptoms causing functional impairment was defined as Premenstrual Dysphoric Disorder (PMDD) [13]. We considered restricted activity as long hours of resting (>10 hours in 24 hours) and limitation of sports activity. An information regarding treatment of menstrual disorders was obtained.

We considered responses like embarrassing, anxiety-inducing, distracting, weird, terrible and irritating at the menstruation as negative emotions; feeling of alright or normalcy was considered as balanced emotions; happy, feeling of maturity or educational events were considered as positive emotions at the onset of puberty.

Out of all addressed participants, 391 gave consent for the study, 385 responded questionnaires were taken for analysis. 13 respondents had diagnosed medical conditions like leiomyoma [3], ovarian cyst [4], pelvic inflammatory diseases [6] and hence, excluded from the study. The final analysis was done on 367 completed questionnaires as incomplete questionnaire were excluded further.

STATISTICAL ANALYSIS
Data was analysed by SPSS version 16.0. Categorical variables were presented as frequencies. The chi-square test was used to compare the proportion of menstrual disorder at early adolescent and in young adult. The level of significance was set at $p<0.05$.

RESULTS
The age of participant was in a range of 18 to 24 years (the meanage 21.1±1.3 years). Socio demographic characteristics are mentioned in [Table/Fig-1]. Data on ethnicity suggested multiracial respondents. Thirty respondents (8.2%) admitted having smoke or alcohol consumption. Nighty two respondents (25.1%) declared their birth-weight below 2.5 kg. Menstrual regularity was found 59% and 78% at postmenarche and early adult age respectively.

The menarche age ranged from 9 to 15 years (the mean age of 12.1±1.1 years). Mother was the primary source of information about puberty before menarche in 246 (63.7%) of respondents. Other sources were teachers, siblings, relatives, friends, newsletters and electronic media. The irregularity of menstruation was noted in 148 (41.5%) respondents at a post-menarche period.

Menstrual characteristics at post-menarche age and young adult age are shown in [Table/Fig-2]. Mild, moderate and severe dysmenorrhea was noted in178, 55 and 15 students at young adult age (71.7%, 22.1%, 6.2% respectively). Physical symptoms were elicited in 228(62.1%), psychological symptoms in 237(64.5%) and behavioral symptoms in 129(35.1%) respondents of premenstrual syndrome. Two respondents reported severe dysphoric symptoms suggesting PMDD.

[Table/Fig-2] shows a reduction in the prevalence of menstrual disorders, except in premenstrual tension. Oligomenorrhea and dysmenorrhea showed a significant reduction in prevalence at early adult age. A [Table/Fig-3] show resolution of various menstrual abnormalities, maximum was noted in oligomenorrhea (91.3%). Persistence of menstrual disorders was found between 8.7% (oligomenorrhea) to 33.3% (menorrhagia). Menstrual related disorders were persisted in higher frequency (in range of 68%-72%).

Pharmacologic treatment for menstrual problem in a postmenarche period was opted by 218 (58%) of respondents, which was reduced to 121 respondents (33%) at young adult age [Table/Fig-4]. We found 2 (1.65%) respondents used antipsychotics for PMDD. At young adult age, 51 students among 121 students (42.1%) took the treatment from health care personnel, 70 (57.9%) students had over the counter medications.

Characteristics	Frequency n (%){n=367}
Age group 18-21 years 21-23 years 23-25 years	210(57.2) 143(39) 14(3.8)
Country of origin India Malaysia China Others	165(45) 83(22.6) 58(15.4) 61(17.0)
Year of study First year Second year Third Year	167(45.5) 96(26.2) 104(28.1)
Socio economical strata Upper SEC* Middle SEC	271(73.9) 96(26.1)
Diet Non-vegetarian Mixed Lactovegetarian/lacto-ovo-vegetarian	92(25) 239(65.2) 16(4.4)
Body mass index Under weight Normal Over weight	75 (20.4) 216 (59.1) 76 (20.9)

[Table/Fig-1]: Socio demographic characteristics of the students.
*SEC- Socio economic class

Variables	Frequency n (%) at post-menarche age, n=367	Frequency n (%) at young adult age, n=367	p-value
Cycle length Polymenorrhea Normal Oligomenorrhea	28 (7.6) 293 (79.9) 46 (12.5)	22 (6) 322 (87.7) 23 (6.3)	o.37 0.0036*
Cycle duration Hypomenorrhea Normal Menorrhagia	34 (9.3) 279 (76) 54 (14.7)	40 (10.9) 284 (77.4) 43 (11.7)	0.46 0.23
Dysmenorrhea Present Absent	325 (88.6) 42 (11.4)	248 (67.6) 119 (32.4)	<0.00001*
Premenstrual syndrome Yes No	230 (62.6) 147 (37.4)	291 (79.2) 76 (20.8)	0.0001*

[Table/Fig-2]: Menstrual characteristics at the post-menarche age and young adult age.
*suggests significant p-value (<0.05), Chi-square test was done.

DISCUSSION

Prevalence of Menstrual Disorder
Regular cycle duration was found in 76% at post-menarche and 77.4% of young adult students. Menorrhagia was reported in 14.7% at post-menarche. Malaysian study reported it as 9.8% [14]. The

Menstrual disorders at the early adolescent age(n)	Resolution of disorders – n (%)	Persistence of disorders-n (%)
Oligomenorrhea (46)	42(91.3)	4 (8.7)
Polymenorrhea (28)	22(78.6)	6 (21.4)
Menorrhagia (54)	36(66.7)	18 (33.3)
Dysmenorrhea(325)	88(27.1)	237 (72.9)
Subjective heavy bleed (83)	64(77.1)	19 (22.9)
Premenstrual syndrome (230)	39 (32.4)	252 (68.6)

[Table/Fig-3]: Outcome of menstrual disordersobserved at the early adolescent age.

Impact/ pharmacological treatment	Early adolescent age n(%) n=367	Early adult age n(%) n=367
School absentees Yes No	 32 (8.7) 335 (91.3)	 88(23.9) 279(76.1)
Restricted activities Yes No	 69 (18.9) 298 (81.1)	 172 (46.7) 195 (53.3)
No. of total users Analgesics Hormonal Antifibrinolytics Antipsychotics	218(59) 194/218 (88.9) 15/218(6.88) 4/218(1.84) 00	121(33) 102/121 (84.29) 12/121(9.91) 5/121(4.13) 2/121(1.65)

[Table/Fig-4]: Impact of menstrual disorders on daily activities and drug therapy.

prevalence of menorrhagia was 10.6% at young adult age. [4], which is in concordance with our study prevalence of 11.7%. Subjective heavy bleeding was noted in 22.6% at post-menarche, which was higher than 17% prevalence found in a study from Malaysia [14]. At young age, heavy bleeding was reported in 5% in study from Nigeria [8], which was lower than our prevalence of 13.1%. This variation reflects differences in diagnostic criteria and aetiology is same as mentioned in menorrhagia.

A normal menstrual interval was found in 294 (80.1%) at post-menarche and 320 (87.7%) at young adults in the same cohort. The prevalence of oligomenorrhea was 12.5%. Similar prevalence was observed in a study from Malaysia (14.4%) at postmenarche [14]. At young adult age, it was reported in 3%-14.9% [4,15], we observed 6.3% prevalence. The prevalence of polymenorrhea observed was 7.6% at post-menarche age, and reported was 21.3% [14]. In young adults, the prevalence of polymenorrhea was observed 4% in a study from Nigeria [8], which is in agreement with our observation of 6%. Higher prevalence of menstrual disorders can be attributed to immaturity of Hypothalamic Pituitary Ovarian (HPO) axis at adolescent period and reduction in prevalence suggests gradual maturity of the same.

The study also showed 148 respondents (41.5%) had irregular menses in post-menarche period. Irregular menstrual cycles are usually an ovulatory and attributed to an immature HPO axis [16]. In our study 81(22%) respondents with irregular menstrual cycles were noted. The prevalence mentioned in other studies was in a wide range of 7.8-53% at young adult age [4,15,17]. This may be due to variation in an establishment of an individual's regular menstrual cycle length, which happens up to six gynecological year, i.e., up to chronological age of 19-20 [16].

The prevalence of premenstrual syndrome was found in 230(62.6%) post menarche respondents and in 291(79.2%) respondents at young adult. A study from Lebanese reported it 54% where 3 or more symptoms of PMS were taken into consideration [18]. A study from Ethiopia reported it 72.8%, where diagnostic criteria was presence of at-least one symptom of PMS [4]. We found severe psychological symptoms diagnosed as PMDD in two respondents. It has been proven that being away from family and staying in university campus has significant association with PMS [18], which was applicable for our young adult group The prevalence of PMS

was significantly higher among young adults; may be related to the stress of advanced studies. PMS is multifactorial and has obscure aetiology. Proposed reasons are alteration in endorphin levels, abnormal serotonin function, trans-capillary fluid imbalance, smoking, alcohol consumption, and physical activity [19].

The proportion of dysmenorrhea was 88.6% (325 respondents) at post menarche, in our study. In other studies wide range, from 16.8% to 92% have been reported [12,14,17,20]. At young adult age, it was between 85%-100% [4,8,12,21]. In our study, we found 67.6% which was lower than reported. Reasons for this variation can be different pain threshold among diverse ethnicity, race and cultural groups and different aetiologies. The usage of pharmacotherapy and variation in tolerance at different age may be a reason for reduced incidence at young adult age.

Course of Menstrual Disorders

In our study, all the respondents achieved menses between 10 to 15 years with the mean age of onset of menarche 12.1± 1.3 years. The age at menarche varies internationally. The study from Malaysia reported it as 12.3±1.1 years [14]. The onset of menstruation is individual specific, but nutrition, geographic location, access to preventive health care facility, socio-economic and environmental conditions do affect the onset of menstruation [17].

We found spontaneous resolution of oligomenorrhea in 91.3%, suggested gradual development of HPO axis after the onset of puberty. Persistence of oligomenorrhea was found in 8.7%, which raises concern for an ovulatory pathology, commonest is Polycystic Ovarian Syndrome (PCOS), particularly when associated with markers like acne, hirsutism and/or menorrhagia. PCOS is seen in 5-10% of reproductive age women, which have long term consequences on cardiovascular, reproductive and metabolic health [22]. New onset oligomenorrhea (82%) identified at young adult age suggests importance of healthy lifestyle and also possibility of secondary underactive ovaries commonly seen in hypothyroidism or hyperprolactinemia [1]. Persistence of polymenorrhea observed in 21% of primarily detected disorders. Denovo disease was seen in 71% of adult polymenorrhea group, both the persistence and denovo polymenorrhea raises concern for systemic and pelvic abnormality [1]. Disease and functional disturbance of ovaries are important causes for polymenorrhea. Persistence of menorrhagia noted up to 33%, which was the highest among persistent menstrual disorders. It denotes conditions like coagulation abnormalities (most common is von-Willebrand disease) in persistent cases and situations involving uterus and its vascular apparatus, hyperandrogenism, and thyroid abnormalities in other cases [23].

High persistence of dysmenorrhea (72%) suggests that once dysmenorrhea is established; it is experienced for many cycles in majority of cases. We didn't find any significant association of dysmenorrhea with diet, birth weight, emotions, BMI, and smoking But significant association of dysmenorrhea was seen with menorrhagia (p-value <0.05). Weismann et al., followed up 996 participants for six years and found that improvement and worsening of dysmenorrhea are equally likely for all women, and reduction in severity was observed more after child bearing [24].

Impact of Menstrual Disorders

We found restriction of social and personal activity in 172 (46.7%) respondents and hindrance of academic activity in 88 (23.9%) respondents due to menstrual disorders at young adult age which were higher observed frequencies observed at early adolescent age. Similar frequencies were reported in the literature [8,25,26]. We noticed that though prevalence of menstrual disorders was reduced with advancing age, academic and social interference was rather increased. This can be explained by their migration and gradual change in attitude, psycho-social perception or hidden pathology. Appropriate counseling, lifestyle modification and timely treatment

should be provided to the affected students to improve quality of life. Improvement in menstrual health will help to enhance the socio-academic performance and to overcome the problems like infertility and metabolic syndrome in future.

LIMITATION

The study can't be applied to all universities or general population as it represents only a sample from one university. Hence, it can't be extrapolated to all Malaysian university students. Secondly, as it is self-reported study about personnel issues, there is a possibility of reply of only socially acceptable answer in the responses. To overcome it, we resorted to the anonymous answering of questionnaire. This study is partial recall base, especially data on puberty, hence missing or altered information is a possibility. Study design of our questionnaire could not provide the time frame of resolution of pubertal menstrual disorders hence, pertinent information cannot be provided.

CONCLUSION

The most prevalent menstrual abnormality was menorrhagia at the early adolescent and the young adult age. Associated the most prevalent menstrual related symptoms were dysmenorrhea at early adolescent age, and premenstrual symptom at the young adult age. Decreasing prevalence of all menstrual abnormalities from an adolescent to early adulthood is noted. The resolution of physiological menstrual disorders was observed at early adult age. Persistence and denovo appearance of few disorders at early adulthood requires clinical evaluation and appropriate treatment. Exact decreasing trends in the prevalence will be useful to counsel the adolescent with different menstrual complaints.

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