



**BMI INFLUENCE ON MENSTRUAL CHARACTERISTICS AND PREVALENCE OF ASSOCIATED SYMPTOMS OF MENSTRUATION AMONG ADOLESCENTS: A CROSS SECTIONAL SURVEY**

**Naga Swathi Sree K\*, Bhavya Sai. K, Tejaswini Vinaya Kadiyala, Bhargav Kumar Nagalla**

Department of Pharmacy practice, Chalapathi Institute of Pharmaceutical Sciences, Guntur, Andhra Pradesh, India.

\*Corresponding author E-mail: [swathichoudary1997@gmail.com](mailto:swathichoudary1997@gmail.com)

**ARTICLE INFO**

**ABSTRACT**

**Key Words**

Age of menarche, menstrual characters, BMI categories, general symptoms and emotional symptoms.



**Aim:** The present study was aimed to assess the prevalence of menstrual irregularities in adolescent and their associated symptoms and to evaluate the affect of BMI on menstruation pattern. **Methods:** A quantitative cross-sectional study was carried out on 325 adolescent females in Guntur region, Andhra Pradesh, India. A structured self administered questionnaire was designed and the subjects are made to fill up the questionnaires. The questions in the Questionnaire related to the socio-demographic, menstruation behavior and associated general and emotional symptoms. Data obtained from the study had been analyzed by using SPSS version 22.0 on windows in which we evaluated frequency, simple percentage and regression. **Results:** A total of 325 respondents, whose mean age was 19.74years were considered. Most of them attained their menarche at the age of 13-15 years. Respondents BMI were calculated. Among those 69.8% have normal body weight and 9.2% of them have overweight. Very few of them (3.1%) were obese. Most of the respondents (74.5%) reported that they have a time gap of 28-31days in between two menstruations (length of menstrual cycle). During menstruation 47.42% women that they have bleeding up to 3-4 days, where as 83.7% have moderate bleeding and 12.6% have heavy bleeding during menstruation. Almost 58.8% of respondents reported moderate pain during menstruation, 16% respondents reported they don't have any pain at all and 25.2% with severe pain. BMI shows the positive relation with several menstrual characters. Most commonly prevalent general symptoms were tiredness (mild (33.85%) and moderate (30.76%)), loss of energy (mild (30.46%) and moderate (31.08%)), general pains and aches (mild (32.61%) and moderate (26.46%). Emotional symptoms like irritability (mild (29.84%) and moderate (26.16%)), anger (mild (21.56%) and moderate (17.2%)) but depression mild form (21.23%) were more prevalent and other symptoms like backache (moderate (26.77%) and severe (20.92%) and acne (mild (25.54%) and moderate (16.62%)) were more prevalent. **Conclusion:** From this study, it was evident that BMI has positive relation with menstrual characters and most prevalent symptoms were tiredness, general aches and pains, irritability, anger, backache and acne. Individuals with BMI overweight and obese category were more prevalent to menstrual irregularities, creating awareness about dietary modification and weight reduction techniques like exercise, walking, running etc will keep the individuals in healthy menstruation zone, also for individual with underweight BMI, counseled about diet and exercise.

## INTRODUCTION:

Menstruation is a normal physiological cycle or process occurring in primates. Which results from expel of blood and shedding of endometrial lining from uterine space. Every adolescence girl has to come across a special period which states the transformation from girlhood to womanhood. This transformation period is marked as menarche. Menarche is an important biological milestone in every female's life. At the age of menarche every female undergoes several changes in their physical, emotional, psychological and mental state. The age of onset of menstruation varies from geographical regions it between 9 to 18 year in most of the United States being about 12 years and 8 months, whereas in India it is slightly lower and has been reported to be around 12 years [1]. Abnormalities of menstruation are a major gynecological problem in adolescence as the reproducers for future generations, adolescent girls would not concern about their own health, but also the health of future generation [2]. Problems of menstruation include premenstrual and menstrual symptoms and disorders of menstruation in those menstrual disorders like menstrual irregularity, menorrhagia and dysmenorrhoea. Among these, dysmenorrhoea is the most common, being reported in 60 to 90% of adolescents, and menstrual irregularity was reported in 43 to 62% of girls during the first year of menstruation [3]. Female mostly experience premenstrual symptoms 7 to 10 days before the onset of bleeding. These include irritability, malaise, headache, acne, abdominal pain etc. there are several etiologies for premenstrual symptoms such as elevated prolactin levels, hypoglycemia or vitamin deficiencies have been proposed, but none of these have proven the exact etiology of PMS [4]. Menorrhagia, one of the most commonly occurring symptoms in

gynecology, is defined as menstruation periods at regular cycle but with excessive flow which may last more than 7 days. Dysmenorrhoea is the second most occurring menstrual disorder it means painful menstruation, typically involving abdominal cramps. Although abnormal bleeding is the major morbid cause in women with menstrual disorder [5] and in some women this abnormal bleeding leads to undergo hysterectomy in world wide. Menstrual problems affect not only the woman quality of life, but also family, social and national economic well being. The present study is aimed to assess the menstrual irregularities in adolescent and their associated symptoms and to evaluate the affect of BMI on menstrual pattern.

## METHODS:

**Study design:** The study design used is "*Quantitative prospective cross-sectional study*".

**Study area and period:** The study was conducted from January-1 to January-31, 2018 at Chalapathi institute of pharmaceutical sciences and also at a nearby residential girl's hostel in Guntur, Andhra Pradesh, India.

**Participants:** The participants are 325 females. The age of the participants ranges between 17-25 years.

**Sampling:** sample size is n=325 and sampling was done by using randomized sampling method.

**Data collection:** A structured self administered questionnaire was designed and the subjects were made to fill it. The questions in the Questionnaire related to the socio-demographic, menstruation behaviour and associated symptoms like general and emotional symptoms. Data collection was done by distributing the pretested structured questionnaire to the individuals and explains the objective of the study and how to fill the

questionnaire and also counseled the subjects regarding the menstrual irregularities and if any query's they posed.

**Inclusion criteria:** 1. Considered age group of 17-25 years (Adolescent age) only because most of the irregularities seen in that age group individuals.

**Exclusion criteria:**

1. Subjects with PCOS, thyroid and other hormonal problems were excluded.
2. Subjects who are taking OCP's and other hormonal pills were also excluded.
3. Married subjects were excluded from study.

**Data analysis:**

We analyze the data obtained from the study using SPSS version 22.0 on windows and evaluated frequency, simple percentage and regression.

**RESULTS:**

Data was collected from a total of 325 respondents whose mean age was 19.74years among those 57.93% respondents were of 20-22years age group, followed by 42.77% of 17-19 years age group. Most of them attained their menarche at the age of 13-15 years (66.4%) and very few of them attained their menarche after 16 years or at 16 years of age. Respondents BMI were calculated. Among those 69.8% were having normal body weight, 9.2% were overweight and very few of them (3.1%) were obese. Most of the respondents (74.5%) reported that they have a gap of 28-31days in between two menstruations, followed by less than 28days in 13.2% individuals and very few respondents(2.5%) reported that they have a menstruation gap of >40 days in between the two successive menstruations. During menstruation 47.42% women have bleeding up to 3-4 days and 41.83% women have bleeding up to 5 days

and very few individuals(0.6%)reported that they have bleeding up to 1-2 days, 83.7% respondents reported moderate bleeding and 12.6% reported heavy bleeding during menstruation. 19.4% respondents reported bleeding in between 2 successive menstruations. Half of the respondents reported moderate pain during menstruation and 16% respondents reported they don't have any pain at all and 25.2% have severe pain. Influence of BMI on menstrual characteristics was analyzed using correlation analysis and all our menstrual characteristics which we measured were having positive relation with body mass index. Table 2. General symptoms experienced by the individuals depends on severity (Mild, moderate, severe) represented in table-3 most common three general symptoms were tiredness (mild 110(33.85%) and moderate 100(30.76%)), loss of energy (mild 99(30.46%) and moderate 101(31.08%)), general pains and aches (mild 106(32.61%) and moderate 86(26.46%) are most prevalent symptoms, other general symptoms are less prevalent. In case of emotional symptoms represented in table-4 most commonly prevalent symptoms were irritability (mild 97(29.84%) and moderate 85(26.16%)), anger (mild 70(21.56%) and moderate 56(17.2%) but depression mild form 69(21.23%) were more prevalent. In case of other symptoms represented in table-5 among them most common backache (moderate 87(26.77%) and severe 68(20.92%) and acne (mild 83(25.54%) and moderate 54(16.62%) were more prevalent.

**DISCUSSION:** In the present study among adolescent about BMI influence on menstrual characteristics and associated symptoms during menstruation, it was evident that BMI has positive relation with the several menstrual characters. In our study most of them 210(64.6%) attained their age of menarche at 13-15 years of age.

**Table-1: Socio-demographic and menstrual characteristics of respondents**

Characteristics	Frequency (N=325)	Percentage (%)
Age of respondents		
17-19years	139	42.77
20-22years	172	52.93
23-25years	14	4.30
BMI categories		
Under weight(<18.5)	58	17.8
Normal(18.5-24.99)	227	69.8
Over weight(25-29.99)	30	9.2
Obese(30-40)	10	3.1
Age of menarche		
10-12years	106	32.6
13-15years	210	64.6
16/>16years	9	2.8
No. Of days between two successive periods (menstrual cycle length)		
<28days	43	13.2
28-31days	242	74.5
32-35days	23	7.1
36-39days	9	2.8
40-43days	8	2.5
No. Of days bleed (duration of menstrual flow)		
1-2days	2	0.6
3-4days	154	47.42
5days	136	41.83
6days	33	10.15
Menstrual flow		
Light	12	3.7
Moderate	272	83.7
Heavy	41	12.6
Bleeding between periods		
Yes	63	19.4
No	262	80.6
Menstrual cramps and pains		
Not at all	52	16.0
Slight	191	58.8
More	82	25.2

**Table: 2 Influence of BMI on menstrual characteristics.**

S.No	Menstrual characteristic	R <sup>2</sup> value
1	No. Of days between two successive periods	0.001
2	No. of days bleed	0.006
3	Menstrual flow	0.003
4	Menstrual cramps and pains	0.005

**Table-3: Frequency and percentage of General symptoms**

	Day time sweat and flushes	Night time sweat and flushes	Poor sleep	Tiredness	Loss of energy	General pain and aches
Severe	5(1.56%)	2(0.62%)	10(3.08%)	7(2.16%)	8(2.46%)	10(3.08%)
Moderate	34(10.48%)	25(7.69%)	68(20.93%)	100(30.76%)	101(31.08%)	86(26.46%)
Mild	61(18.76%)	39(12%)	54(16.6%)	110(33.85%)	99(30.46%)	106(32.61%)
None	225(69.2%)	259(79.69%)	193(59.39%)	108(33.23%)	117(36%)	123(37.85%)

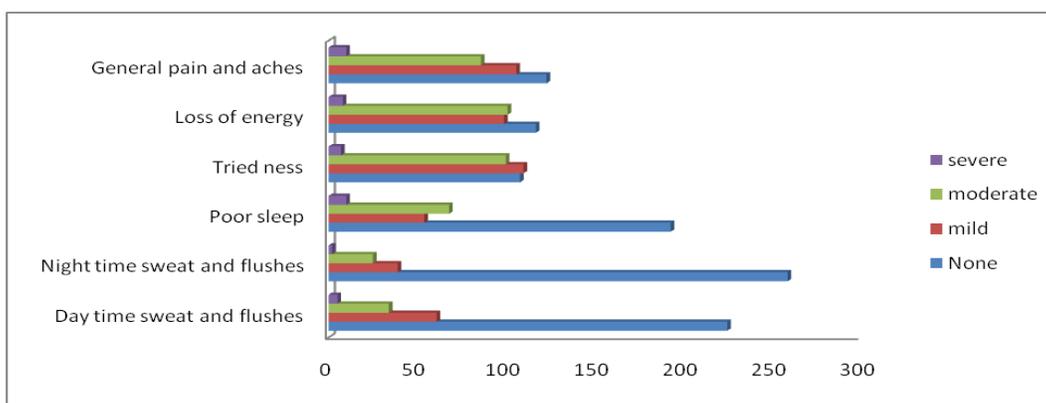


Fig-1: General symptoms experienced by the individuals during menstruation

**Table-4: Frequency and percentage of Emotional problems**

	Tearfulness	Depression	Irritability	Anger	Panic attacks	Palpitations	Aggression
Severe	7(2.16%)	4(1.24%)	7(2.16%)	5(1.55%)	4(1.24%)	0	0
Moderate	37(11.38%)	32(9.84%)	85(26.16%)	56(17.2%)	12(3.69%)	9(2.77%)	5(1.54%)
Mild	47(14.46%)	69(21.23%)	97(29.84%)	70(21.56%)	23(7.076%)	22(6.77%)	16(4.93%)
None	234(72%)	220(67.69%)	136(41.84%)	194(59.69%)	286(88%)	294(90.46%)	304(93.53%)

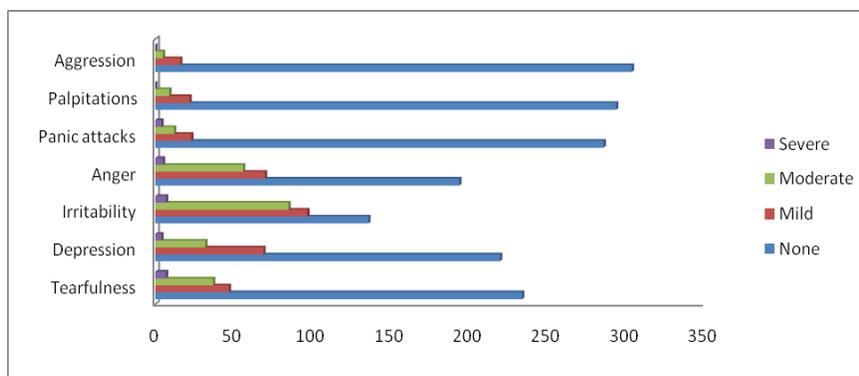
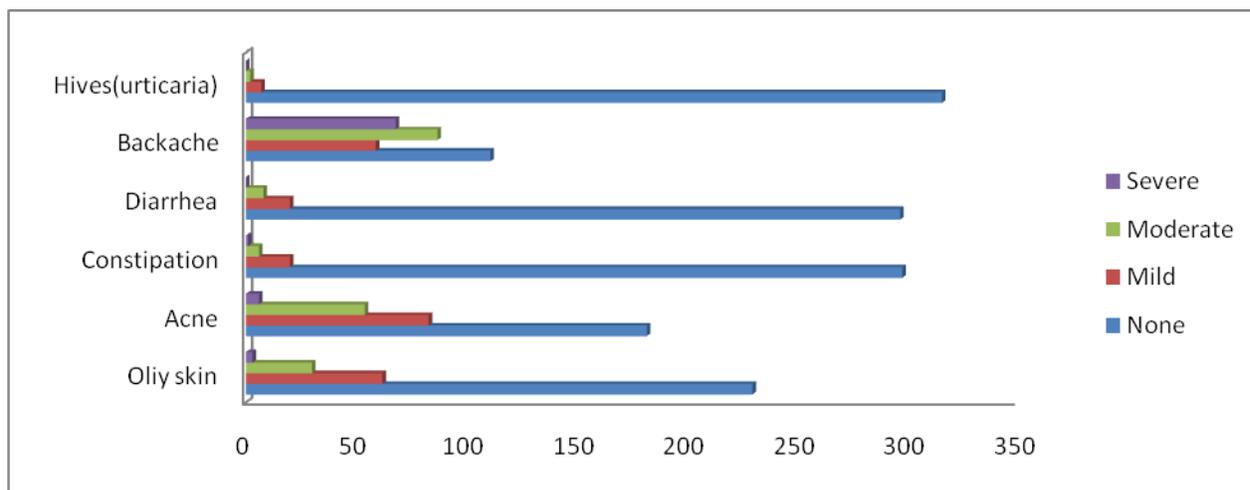


Fig-2: Emotional problems experienced by the individuals during menstruation

**Table-5: Frequency and percentage of other symptoms**

	Oily skin	Acne	Constipation	Diarrhea	Backache	Hives
Severe	3(0.92%)	6(1.84%)	1(0.31%)	0	68(20.92%)	0
Moderate	30(9.23%)	54(16.62%)	6(1.85%)	8(2.46%)	87(26.77%)	2(0.62%)
Mild	62(19.08%)	83(25.54%)	20(6.15%)	20(6.16%)	59(18.16%)	7(2.15%)
None	230(70.77%)	182(56%)	298(91.69%)	297(91.38%)	111(34.15%)	316(97.23%)



**Fig-3: other symptoms experienced by the individuals during menstruation**

According to study conducted by Dr. Dharampal G regarding age at menarche and menstrual pattern among adolescent girls (6) the mean age of menarche±std deviation was 13.51 + 1.04 (N=390) (Dr. Dharampal G et.al., 2012). According to Mr. Tibin Joseph study about prevalence of PMS among adolescent girls(7), most of them attained their age of menarche at 13-14 yrs 48(80%), n=60 (Mr. Tibin Joseph et.al., 2016). studies conducted in Kalamboli, the mean age at menarche was found to be 13.32 years, in West Bengal 12.8 years and in Turkey 12.81 years (Nemade D *et al.* 2009, Dasgupta A *et al.* 2008 & Demir SC *et al.* 2000)(8,9,10). In present study, the menstrual cycle length (number of days between two successive periods) was reported mostly to be 28-31days, 242(74.5%). According to Muluken Teshome Shiferaw's study regarding Menstrual problems and associated factors among students in Ethiopia(11) was reported

that menstrual cycle length of 21-35days were more prevalent 382(81.3%), n= 470 (Muluken Teshome Shiferaw's et.al., 2014). According to Dr. Dharampal G study conducted regarding age at menarche and menstrual pattern among adolescent girls stated that many of them has menstrual cycle length of 21-35 days, 390(69.52%) n= 1100 (Dr. Dharampal G et.al., 2012). Duration of menstrual flow was more for 3-4days, 154(47.42) reported in present study, but in study conducted by Muluken Teshome Shiferaw's study regarding Menstrual problems and associated factors among students in Ethiopia, reported that duration of menstrual flow was more for 3-7days, 370(78.8%), n=470 (Muluken Teshome Shiferaw's et.al., 2014). But according to Dr. Dharampal G study duration of menstrual flow more for 2-4days, 379(67.56%) n=1100. So almost the duration of menstrual flow was between 3-6days on average.

Menstrual flow was moderate 272(83.7%) according to present study, Sule Gokyildiz study about The Effects of Menorrhagia on Women's Quality of Life: A Case-Control Study(12) reported that menstrual flow was heavy 52(37.7%) in case(test) group, in control group severity was moderate 101(64.7%), n=138.( Sule Gokyildiz et.al., 2013). In present study individuals experience moderate pain 191(58.8%) during menstruation, Menorrhagia (pain during menstruation) can be associated with fibroids, endometriosis, adenomyosis, cervical or endometrial malignance, intrauterine devices, or pelvic infection. Sometimes it can be caused by factors in relation to hypothyroidism or bleeding illnesses (13, 14). Distribution of subjects according to BMI categories, more in normal category 227(69.8%), underweight 58(17.8%), overweight 30(9.2%), obesity 10(3.1%). But according to study conducted by *Saira Dars regarding Relationship of menstrual irregularities to BMI and nutritional status in adolescent girls*(15) reported that 69% fall under normal BMI category, 4% overweight, 27% underweight, all the subjects with BMI normal has normal menstrual cycle but overweight category has infrequent cycles. But according to present study BMI shows the positive relationship with menstrual characters it means that BMI has a great impact on menstruation. Mostly the subjects who fall under overweight and underweight categories have irregular menstruation. In present study most commonly exhibited general symptoms by subjects were tiredness 110(33.85%) with mild severity, loss of energy 101(31.08%) with moderate severity and general pains and aches 106(32.61%) with mild severity, But according to Mr. Tibin Joseph study tiredness was reported in 39(65%) no severity was mentioned. Most common emotional problems reported in our study were irritability 97(29.84%) with mild

severity and anger 70(21.56%) also mild severity, but in study by Mr. Tibin was reported that irritability 36(60%) no severity data. Other symptoms in the present study were backache 87(26.77%) with moderate severity, severe 68(20.92%) and acne & oily skin were more with mild severity 83(25.54%) and 62(19.08%) respectively. But according to Tibin study backache was reported with higher frequency of 44(73%). Finally by conducting present study we noticed that BMI has great influence on menstruation so creating awareness about BMI and counseling about weight reduction techniques and dietary management for overweight and obese one's and how to maintain a healthy BMI by proper nutritional intake for underweight population in order to improve the menstruation and associated problems and increase the quality of life of individuals.

**LIMITATIONS OF STUDY:** Awareness could have been provided to the sample regarding diet and exercise to maintain healthy BMI and proper menstruation. This study could have been done in large sample size.

**CONCLUSION:**

Menstruation is process of transformation from girlhood to womanhood. It is a normal biological phenomenon in which every female population experienced. Age of menarche milestone in every girl life, during that stage lot of physical, emotional, psychological changes takes place in the body. In the present study we concluded that BMI has positive effects on menstruation, how it influence the menstrual characters of the individuals and what type of general, emotional and other common type of symptoms are more prevalent in study population. Most prevalent symptoms were tiredness, general aches and pains, irritability, anger, backache and acne.

Individuals with BMI overweight and obese category were more prevalent to menstrual irregularities, creating awareness about dietary modification and weight reduction techniques like exercise, walking, running etc will keep the individuals in healthy menstruation zone, for individual with underweight BMI counseled about diet and exercise. Diet and exercise has a great influence on BMI and menstruation further more studies in future will need to know the effects of diet and exercise on menstruation.

**ACKNOWLEDGMENT:** We thank the management and principal of Chalapathi institute of pharmaceutical sciences for providing necessary facilities to do the research work.

**CONFLICT OF INTERESTS:** Conflict of interest declared none

#### REFERENCES:

1. Khadilkar, V. V., Stanhope, R. G., & Khadilkar, V, Secular trends in puberty. *Indian Pediatr*, 2006, 43, 475-478.
2. Sharad Bhausahab Pandit, Common Menstrual Problems among Adolescent students, *Sinhgad e Journal of Nursing, Vol. IV, Issue I, June 2014*.
3. Cakir M, Mungan I, Karakas T, Giriskan I, Okten A, Menstrual pattern and common menstrual disorders among university students in Turkey, *Pediatr Int*, 2007;49:938-42.
4. Cerin A, Collins A, Landgren BM, Eneroth P. Hormonal and biochemical profiles of premenstrual syndrome, *Acta Obstet Gynecol Scand*, 1993; 72:337-43. PubMed, Google Scholar.

5. Harlow SD, Ephross SA, Epidemiology of menstruation and its relevance to women's health, *Epidemiol Rev*, 1995, 17:265-86.
6. Dharampal G. Dambhare et.al., Age at Menarche and Menstrual Cycle Pattern among School Adolescent Girls in Central India, *Global Journal of Health Science*, Vol. 4, No. 1; January 2012.
7. Tibin Joseph, Prof. Nandini M et.al., Prevalence of Premenstrual Syndrome (PMS) Among Adolescent Girls, *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, Volume 5, Issue 1 Ver. 1 (Jan. - Feb. 2016), PP 24-27.
8. Nemade, D., Anjenaya, S., & Gujar, R, Impact of health education on knowledge and practices about menstruation among adolescent school girls of Kalamboli, Navi-Mumbai. *Health and Population: Perspectives and Issues*, 2009, 32 (4), 167-175.
9. Dasgupta, A. & Sarkar, M, Menstrual Hygiene: How Hygienic is the Adolescent Girl? *Indian Journal of Community Medicine*, 2008, 33 (2), 77-80.
10. Demir, S. C., Kadayifci, T. O., Vardar, M. A., et al, Dysfunctional uterine bleeding and other menstrual problems of secondary school students in Adana, Turkey. *J Pediatr Adolesc Gyecol*, 2008, 13 (4), 171-5.
11. Muluken Teshome Shiferaw, Mamo Wubshet et.al, menstrual problems and associated factors among students of Bahir Dar University, Amhara National Regional State, Ethiopia: A cross-sectional survey, *Pan African Medical Journal*. 2014;
12. Sule Gokyildiz, Ergul Aslan et.al., The Effects of Menorrhagia on Women's Quality of Life: A Case-

Control Study, ISRN Obstetrics and Gynecology Volume 2013, Article ID 918179, 7 pages.

13. B. S. Apgar, A. H. Kaufman, U. George-Nwogu, and A. Kittendorf, "Treatment of menorrhagia," *American Family Physician*, vol. 75, no. 12, pp. 1813–1819, 2007.
14. M.K.Oehler and M. C. P. Rees, "Menorrhagia: an update," *Acta Obstetrica et Gynecologica Scandinavica*, vol. 82, no. 5, pp. 405–422, 2003.
15. Dars S, Sayed K, Yousufzai Z., Relationship of menstrual irregularities to BMI and nutritional status in adolescent girls, *Pak J Med Sci*, 2014;30 (1):140-144.