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Original Research Article

The affected factors of puberty and menstrual disturbances among female students at Al-Andalus university

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ABSTRACT

Background: The aim of the study was to determine the pubertal, menarcheal age and menstrual disturbances, and the factors affecting them, during the war in Syria, among AL-Andalus university female students.
Methods: A self-reported questionnaire was answered from 156 students. The questions were about socio-demographic information, reproductive and menstrual patterns, and the participants' lifestyle. Inclusion criteria included girls 17 to 25 years old, no systemic diseases and completed the questionnaire. The questionnaire was answered in the university. The researchers clarified the aim of the study and got the voluntary consent. The data of 148 girls were entered into SPSS. Exclusion criteria excluded girls (≤17 and ≥25) years and those who did not complete the questionnaire. The study was conducted from 20 January 2020 to 20 March 2020.
Results: 148 cases were analyzed. The mean age of puberty and menarche of our students are 12.38±1.41 and 13.38±1.35 years respectively. Fast food and changing adopted place have a significant association with menstrual disturbances ($p<0.05$). Blood group, faculty, weight and the mother's menarcheal age have no effects on them ($p>0.05$).
Conclusions: Not found any change in the age of puberty and menarche, but this does not prevent to make more studies in different places in Syria in the future.

Keywords: Fast foods, Menarche, Menstruation disturbances, Nutritional status, Puberty

INTRODUCTION

Puberty is a defining time of many adolescents' lives. It is a series of events that includes thelarche, pubarche, and menarche.[1] Puberty means the onset of adult sexual life.[2] Secular changes in puberty occur from one generation to another and need to be documented.[3] Puberty entails a progressive nonlinear process through the interaction and cooperation of biological, physical, and psychological changes.[4] It physiologically starts between the ages of eight and 13 years in girls and nine and 14 years in boys.[5] Over the last decades, the onset of puberty in girls has occurred earlier without a change in age at menarche.[6] The mechanism that initiates the onset of puberty is largely unknown but the age of onset is mainly under genetic control and influenced by environmental factors including nutrition.[7,8] Nutrition is one of the most important factors affecting pubertal development. Caloric-protein malnutrition cause pubertal delay.[9,4,10] Overweight or obese children are more likely to enter puberty early.[4,9] The timing of the onset of this sex bias led us to hypothesize that ovarian hormones contribute to depression and anxiety during puberty.[11] Menarche is one of the most important biological signals in the life of a woman.[12] Normal menstrual cycles have a length of 21-35 days (mean 28 days), lasts for three to seven days and menstrual blood loss of 30-50 ml/month is normal. For most young women, the growth spurt and secondary

sexual characteristics, such as thelarche and the growth of pubic and axillary hair, usually precede the onset of menstruation by about two years.[13] Current research from around the world indicates a trend toward younger ages at the first menstruation.[14] Age at menarche reflects the health status of a population. This marks the beginning of sexual maturation and is affected by nutritional status and prevailing environmental conditions.[15] The mother's menarcheal age is a good predictor of the daughter's menarcheal age in non-obese girls and the BMI is an important factor.[12] Body weight, high animal protein intake, family stress (e.g. single parenting) and physical activity seem to influence age at menarche in most populations.[16] A previous study showed that psychological trauma, physical injury and low socioeconomic status, which are provoked by the events of war, delay the age of menarche.[17] Menarche occurred later for those from rural areas and those born before 1965.[18] The mean menarcheal age has been decreasing in cities. Therefore, it seems necessary for the families to be aware about the influence of time, trend and affecting factors on menarche; this helps them to make good decisions when educating their teenagers.[19] Adolescent girls face a gamut of problems of which the menstrual problems are the most common.[20] So any significant deviations from monthly cycles can signal disease or dysfunction.[21] Both stress score and body mass index (BMI) were found to be significant predictors for having experienced irregular menstrual cycle.[22] Other studies suggested that, smoking, obesity, and stress, were significantly associated with menstrual cycle irregularity.[23]

Despite the fact that the menstrual disturbances and the related factors have been studied for a long time in different countries, the information on the role of this factors in our country is scant and ambiguous (link it to ethnic and cultural related factors).

So, the aim of this study was to investigate the puberty age and associated factors for menstrual disturbances in a sample of female students at AL-Andalus University, who have their puberty during the war time in Syria and live out of familial home. The war may have an influence on the life and menstrual cycle characteristics on these girls, so we wanted to study some factors to see if they have any effects on these students.

METHODS

The study was conducted from 20 January to 20 March 2020 and consisted of a cross sectional survey on girls attending six medical faculties (medicine, dentistry, pharmacy, nursing, biomedical engineering, hospital administration) randomly selected from AL-Andalus university (university of medical science) in AL-Qadmus city, Tartuos, Syria. For this study, the total sample size was 156 girls. They are from different regions of Syria; additionally, some of them are from nearby countries (Iraq, UAE, KSA and Lebanon). A questionnaire was distributed to 156 girls between the ages of 17 to 25 years to be completed at the university. A simple random sampling technique was used. Data from 148 girls who agreed to participate in the study and completed the questionnaire were evaluated, and eight questionnaires were excluded because they were incomplete. All answers to the questionnaire were produced by the participants and they were subjective. The questionnaire has three parts; the first part containing: socio-demographic information (initial of the name, age, adopted place in the periods (pre-puberty, post-puberty and during college), faculty and the blood group). The second part was asking about reproductive issues and menstrual pattern [menarcheal age, pubertal age, duration of menses, length of menstrual cycle, and familial history of menarche (mother)]. The final part addressed the lifestyle and the behavioral issues including psychological and somatic stress (wars, accidents, refugees) according to the war time in Syria, previous concepts about menses (yes, no), impression of menarche (fearing or mixed feelings), (pre-puberty and post-puberty) body weight (under-weight, normal, over-weight and obesity) and nutrition (cooking, variant (fast food, canned food and home cooking).

The data were collected by three female medicine students at Al-Andalus university in the clinic of obstetrics and gynaecology. Voluntary consent was obtained from each participant. The questionnaire was distributed to every participant and collected on the same day to ensure confidentiality and security of information. The final questionnaire comprised 18 questions. Students were asked to select from the options yes/no or to use one choice for their answer. The researcher sat next to each participant, explained simple ideas about the questionnaire and the researcher answered their questions. The questionnaire took about 20 minutes to be completed. Inclusion criteria were female students between the ages of 17 to 25 years without systemic diseases, who completed the questionnaire. Some participants were excluded from the study because they didn't meet the criteria. Data were checked, coded and entered into SPSS version 25 (IBM, Armonk, NY, USA) for analysis. Data entry was made by the principal investigator. Texts and tables were used to present the results. Firstly, we inventoried the percentage, frequency, Mean, range, standard deviation and corresponding 95% confidence interval (CI). Also, used chi square test, t-test and the ANOVA test. Finally, statistically the significance level was considered at $p<0.05$.

Participation was voluntary. The ethics committee of the AL-Andalus university approved the research protocol. There wasn't any funding or subsidizing organization for this paper.

RESULTS

In this survey, a total of 156 individuals were included with a response rate of 94.87%. Eight questionnaires

were found to be incomplete and excluded from the analysis.

The study analysed the questionnaires of 148 (94.87%) girls. The range of their age was 18 to 24 years with the mean age of 20.22±1.39 years. Fifty-seven (38.5%) of the study participants were from faculty of pharmacy and 47 (31.8%) of them were from the faculty of medicine. Only two (1.4%) females were from the faculty of biomedical engineering. The number of the female students who lived out of Syria before puberty was 13 (8.8%) and the Syrian students were 135 (91.2%). Tartous city has the most participants 55 (37.2%). While the students who lived out of Syria after puberty were 12 (8.1%), the girls who lived in Syria were 136 (91.9%). Fifty-eight (39.2%) of them were in Tartous, 24 (16.2%) in Lattakia and the others were from different parts in Syria. During college 77 (52%) of girls lived far from home. Most of the participants have the blood group (A) with a frequency of 49 (33.1%), 33 (22.3%) of the students have (O) group and groups (B) and (AB) were found equal of 12 (8.1%) girls (Table 1).

Table 1: Socio-demographic characteristics of Al Andalus university female students, Al Qadmus 2020.

Variables	Frequency (n=148)	Percentage (%)
Faculty		
Pharmacy	57	38.5
Medicine	47	31.8
Nursing	5	3.4
Dentistry	22	14.9
Biomedical engineering	2	1.4
Administration hospitals	10	6.8
Missing	5	3.4
Adopted place before puberty		
In Syria	135	91.2
Out of Syria	13	8.8
Adopted place after puberty		
In Syria	136	91.9
Out of Syria	12	8.1
Adopted place during college		
Far from home	80	54.1
Near home	67	45.3
Missing	1	0.7
Blood groups		
A	49	33.1
B, AB	12	8.1
O	33	22.3
Missing	42	28.4

For menstrual patterns of the participants; the mean age at menarche was 13.38±1.35 years with a range of 10 to 17 years. Approximately about 44 (29.7%) of the respondents experienced menarche as they were 13 years old. The appearance of secondary sexual characteristics was in the range of nine to sixteen years, 43 (29.1%) individuals were 12 years old and the mean was 12.38±1.41 (Table 2).

Table 2: Pubertal and menarcheal age of Al Andalus university female students, Al Qadmus 2020.

Year	The appearance of secondary sexual characteristics		Age at menarche (years)	
	Frequency (n=148)	%	Frequency (n=148)	%
9	4	2.7	-	-
10	8	5.4	2	1.4
11	13	8.8	8	5.4
12	43	29.1	27	18.2
13	30	20.3	44	29.7
14	18	12.2	40	27.0
15	3	2.0	15	10.1
16	3	2.0	9	6.1
17	0	0	2	1.4
Total	122	82.4	147	99.3
Missing	26	17.6	1	0.7

The duration of menses by 139 (93.9%) girls was three to seven days and only for eight (5.4%) girls was more than seven days. One hundred and twelve (75.7%) girls had normal menstrual cycle length (21-35) days; in three cases (2%) the duration of menses was less than 21 days and in five participants (3.4%) it was more than 35 days. The mother's history of menarche was normal in 89 girls (60.1%), while 44 of the students (29.7%) did not have any information about it (Table 3).

In the lifestyle of the respondents, found that about 29 females (19.6%) had stress, 19 of them (12.8%) were under somatic and psychological stress. Ten girls (6.8%) were only under psychological stress. One hundred and six of them (71.65%) had a previous idea about menarche and 42 (28.4%) did not have. The common impression of menarche by 47 participants (31.8%) was mixed feelings and in 45 of them (30.4%) the feeling was fear. Eighty-two of the females (55.4%) had normal weight before puberty, 55 of them (37.2%) were under-weight and only one girl (0.7%) was obese. The weight after puberty was under-weight in 31 of the cases (20.9%), normal weight found in 92 of the girls (62.2%), and four girls (2.7%) were obese. The nutrition by 53 (35.8%) was home cooked food and 95 (64.2%) was variant; home cooked and fast food (Table 4).

With regard to the factors associated with menstrual disturbances, our study found that there is a significant statistical association between nutrition and the length of the menstrual cycle ($p=0.008$). Meanwhile, this association is not present between the nutrition and the duration of this cycle ($p=0.73$). Also, found that changing the adopted place has a statistically significant correlation with the length of the menstrual cycle ($p<0.001$), in contra to its correlation with the duration of menses

which was not important (p=0.44). Eating fast food singled out a statistically significant association with both duration of menses and length of the menstrual cycle by (p=0.001). A remarkable non- significant association was observed between cycle length, duration of menses and other factors (blood group, faculty, adopted place during college, weight after puberty) (p>0.05). Finally, by studying the correlation between the menarcheal age, pubertal age and the following variables; pre-pubertal adopted place, blood group, stress, nutrition, weight before puberty, and the familial history of menarche, a non-significant association between them was observed (p>0.05) (Table 5).

Table 3: Reproductive characteristics and menstrual patterns of Al Andalus university female students, Al Qadmus, 2020.

Variables		Frequency (n=148)	Percentage (%)
Frequency of menstrual cycle (normal: 21-35) (Days)	Less than 21	3	2.0
	From 21 to 35	112	75.7
	More than 35	5	3.4
	Missing	28	18.9
Duration of menstrual flow (normal: 3-7) (Days)	Less than 3	0	0
	From 3 to 7	139	93.9
	More than 7	8	5.4
	Missing	1	0.7
Familial history of menarche of the mother	Normal	89	60.1
	No idea	44	29.7
	Missing	15	10.2

Table 4: Lifestyle and behavioral issues of Al Andalus university female student, Al Qadmus, 2020.

Variables		Frequency (n=148)	Percentage (%)
Stress	Psychological stress	10	6.8
	Psychological and somatic stress	19	12.8
	Non stress	119	80.4
Previous idea about menarche	Yes	106	71.6
	No	42	28.4
Impression of menarche	Mixed feeling	47	31.8
	Fearing	45	30.4
	Missing	56	37.8
Weight before puberty	Under-weight	55	37.2
	Normal	82	55.4
	Over-weight	10	6.8
	Obese	1	0.7
Weight after puberty	Under-weight	31	20.9
	Normal	92	62.2
	Over-weight	21	14.2
	Obese	4	2.7
Nutrition	Cooked food	53	35.8
	Variant (cooked food, fast food)	95	64.2

Table 5: Variables and their association with comparison set.

Variables	Menarcheal age (year)		Secondary sexual characteristics age (year)		Length of menstrual cycle (days)		Duration of menses (days)	
	P	CL 95%	P	CL 95%	P	CL 95%	P	CL 95%
Nutrition								
Cooking	0.880	(12.63, 13.70)	0.995	(11.83, 12.97)	0.008	(1.90, 2.03)	0.737	(1.97, 2.16)
Variant		(13.04, 13.59)		(12.09, 12.68)		(1.99, 2.13)		(2.01, 2.13)

Continued.

Variables	Menarcheal age (year)		Secondary sexual characteristics age (year)		Length of menstrual cycle (days)		Duration of menses (days)	
	P	CL 95%	P	CL 95%	P	CL 95%	P	CL 95%
Eating fast food								
Very rare						(1.93, 2.02)		(1.98, 2.07)
Every day						(1.22, 2.50)		(1.83, 2.74)
<5 times monthly	-	-	-	-	0.001	(1.97, 2.09)	0.001	(1.98, 2.14)
5-10 times monthly						(1.94, 2.33)		(2.00)
>10 times monthly						(1.79, 2.49)		(1.79, 2.49)
Stress								
Yes	0.879	(12.56, 13.91)	0.749	(11.67, 12.90)	–	(1.96, 2.23)	–	(1.96, 2.23)
No		(13.03, 13,57)		(12.12, 12.72)		(1,95, 2.07)		(2.01, 2.12)
Faculty								
Medicine		(12.92, 13.86)		(11.81, 12.90)		(1.97, 2.15)		(1.97, 2.09)
Dentistry		(12.59, 14.13)		(11.80, 13.25)		(2.00)		(1.93, 2.35)
Nursing		(11.76, 13.84)		(11.16, 13.24)	0.204	(1.24, 2.36)	0.650	(1.64, 2.76)
Biomedical engineering	–	–-	–	–-		–-		–-
Medical administration		(12.75, 14.00)		(12.05, 12.95)		(2.00)		(2.00)
Pharmacy		(12.73, 13.65)		(11.80, 12.74)		(1.94, 2.16)		(1.99, 2.17)
Blood group								
A		(12.82, 13.68)		(12.08, 12.85)		(1.89,2.11)		(1.97, 2.17)
B	0.645	(11.90, 15.25)	0.767	(10.67, 14.76)	0.749	(2.00)	0.311	(2.00)
AB		(12.47, 14.53)		(11.53, 13.47)		(1.66, 2.34)		(1.90, 2.50)
O		(12.69, 13.77)		(11.58, 12.81)		(1.96, 2.12)		(1.97, 2.19)
Pre-pubertal adopted place								
In Syria	0.388	(12.99, 13.51)	0.324	(12.06, 12.61)		–		–
Out of Syria		(12.50, 14.50)		(12.23, 13.77)				
Changing adopted place								
Yes	0.349	(13.17, 13.79)	0.119	(12.42, 13.05)	<0.001	(2.00, 2.17)	0.448	(1.99, 2.14)
No		(12.72, 13.46)		(11.70, 12.48)		(1.92, 2.05)		(2.00, 2.15)
Adapted place during college								
Far from home	-	–		–	0.876	(1.97, 2.13)	0.914	(2.00, 2.14)
Home		–		–		(1.93, 2.07)		(1.99, 2.15)
Previous concept about menarche								
Yes	0.688	(13.07, 13.61)	0.964	(12.19, 12.76)	0.900	(1.98, 2.11)	0.851	(2.02, 2.15)
No		(12.56, 13.64)		(11.62, 12.78)		(1.90, 2.10)		(1.97, 2.10)

Continued.

Variables	Menarcheal age (year)		Secondary sexual characteristics age (year)		Length of menstrual cycle (days)		Duration of menses (days)	
	P	CL 95%	P	CL 95%	P	CL 95%	P	CL 95%
Weight before puberty								
Under- weight	0.993	(12.81, 13.97)	0.964	(11.92, 13.04)	–	–	–	–
Normal		(12.95, 13.52)		(12.09, 12.72)				
Over-weight		(12.40, 13.82)		(10.91, 12.86)				
Obesity		-		-				
Weight after puberty								
Under- weight	–	–	–	–	0.800	(2.00)	0.220	(1.97, 2.43)
Normal						(1.96, 2.10)		(1.99, 2.09)
Over- weight						(1.92, 2.23)		(1.92, 2.23)
Obesity						(2.00)		(2.00)
Familial history of menarche (mother)								
Early	0.112	(11.52, 16.48)	0.739	(9.80, 15.54)	–	–	–	–
Normal		(12.98, 13.68)		(12.05, 12.77)				
Delayed		(12.38, 13.96)		(10.67, 13.33)				
No idea		(12.71, 13.44)		(11.98, 12.81)				

DISCUSSION

The mean age of puberty in this study was 12.38±1.41 years with [95% CI (19.98; 20.46)]; and the mean age of menarche was 13.38±1.35 years with [CI 95% (13.16; 13.60)]. A study in KSA showed that menarche's mean age for Saudi young females was 11.63 years and for non-Saudi young females was 11.47 years.[24] In our study we observed that the mean age of puberty and menarche was within normal range (eight to thirteen years) according to Farello study; that could be because the puberty of these girls was during the beginning of the war.[5] In other words, war had no effect on puberty in our study. A study in Bosnia showed that psychological trauma and physical injury which were provoked by war delayed the age of menarche.[17] In comparison with this study, did not find any association between stress and menarcheal age with [95% CI (12.87; 13.99)]. Twenty eight percent of the participants did not have previous information about menarche because talking about this subject in the Syrian society is considered a private issue

and noncurrent in public. In turn, that justifies the large percentage of fear among girls with [95% CI (1.27; 1.57). This finding was similar to another study conducted on girls in Pittsburgh which found that African American girls, who had higher depression symptoms, progressed through puberty earlier, but at a slower tempo than European American girls.[25] In this study the nutrition has a significant correlation with the length of menstrual cycle; especially dependence on eating fast food which had a strong association with menstrual disturbances with (95% CI) (Table 5). This finding is supported by previous systemic review studies.[4, 16] In this study, the blood group did not have any association with puberty, menarche, length of menstrual cycle and duration of menses with (95% CI) (Table 5). In contra a Chinese study found that the ABO blood group gene and TRAF2 gene could be one of the causes of menstrual disturbances.[26] The length of menstrual cycle and the duration of menses are not affected by the type of faculty with (95% CI) (Table 5). In this study didn't find association between body weight before puberty and menarcheal or pubertal age with (95%CI) (Table 5); that wasn't consistent with the finding in a previous study which confirms that obesity during childhood can accelerate pubertal onset.[9] Also, didn't find any association between the mother's history of menarche and menarcheal or pubertal age with (95% CI) (Table 5). In contra, a Turkish study showed that the menarche was similar to mothers among non-obese girls.[12]

Limitations

The outcomes of this study variables were retrospectively assessed and susceptible to recall bias. Because they are depending on the participant's personal impression and their retrospective and subjective report and observation.

CONCLUSION

Did not find any change in the age of puberty and menarche in the specimen, but this does not prevent to make more studies in different places in Syria in the future. So, hope to continue studies which could be generalized and which include more participants.

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REFERENCES

1. Marsh CA, Grimstad FW. Primary amenorrhea: diagnosis and management. Obstet Gynecol Surv. 2014;69(10):603-12.
2. Hall JE. Guyton and Hall. In: Textbook of Medical Physiology. Puberty, Menarche and Menopause. 13th ed. Elsevier. 2015:599.
3. Eyong ME, Ntia HU, Ikobah JM, Eyong EM, Uket H, Enyuma C et al. Pattern of pubertal changes in Calabar, South South Nigeria. Pan Afr Med J. 2018;7;31:20.
4. Soliman A, De Sanctis V, Elalaily R. Nutrition and pubertal development. Indian J Endocrinol Metab. 2014;1:S39-47.
5. Farello G, Altieri C, Cutini M, Pozzobon G, Verrotti A. Review of the Literature on Current Changes In the Timing of Pubertal Development and the Incomplete Forms of Early Puberty. Frontiers Pediat. 2019;10:3389-6.
6. Lee JE, Jung HW, Lee YJ, Lee YA. Early-life exposure to endocrine-disrupting chemicals and pubertal development in girls. Apem. 2019;24(2):78-91.
7. Durand A, Bashamboo A, McElreavey K, Brauner R. Familial early puberty: presentation and inheritance pattern in 139 families. BMC Endocr Disordm. 2016;16(1):50.
8. Yermachenko A, Mogilevkina I, Gurianov VG, Getsko O, Dvornyk V. Non-genetic risk factors for early and late age at menarche in Eastern Ukrainian females. Anthropol Anz. 2017;74(1):45-56.
9. Muñoz-Calvo MT, Argente J. Nutritional and Pubertal Disturbances. Endocr Dev. 2015;29:153-73.
10. Delemarre-van de Waal HA, van Coeverden SCCM, Engelbregt MTJ. Factors affecting onset of puberty. Horm Res. 2002;57(2):15-8.
11. Boivin JR, Piekarski DJ, Wahlberg JK, Wilbrecht L. Age, sex, and gonadal hormones differently influence anxiety- and depression-related behavior during puberty in mice. J psyneuen. 2017;85:78-87.
12. Ersoy B, Balkan C, Gunay T, Egemen A. The factors affecting the relation between the menarcheal age of mother and daughter. Child Care Health Dev. 2005;31(3):303-8.
13. Bain CM, Burton K, McGavigan CJ. Gynaecology Illustrated.In: Abnormalities of Menstruation. 6th ed. Churchil Livingstone. Elsevier. 2011;88.
14. Olszewska K, Kliś K, Teul I, Wronka I, Pomeranian. Early age at menarche - relationship with socioeconomic status and selected factors connected with health status. Life Sci. 2015;61(1):94-8.
15. Kwame Ameade EP, Garti HA. Age at Menarche and Factors that Influence It: A Study among Female University Students in Tamale, Northern Ghana. Plos One. 2016;11(5):e0155310.
16. Yermachenko A, Dvornyk V. Nongenetic determinants of age at menarche: a systematic review. Biomed Res Int. 2014:371583.
17. Tahirović HF. Menarchal age and the stress of war: an example from Bosnia. Eur J Pediat. 1998;157(12):978-80.
18. Kim S, Park J, Chung K. A study on the menarche of Korean women. Chung Ang Ui Dai Chi. 1986;11(4):343-50.
19. Tayebi N, Yazdznpanahi Z, Yektatalab S, Akbarzadeh M, Zare N. Pattern of menarche age (normal, early and late) and its relationship with some demographic characteristics in girls and their parents. Int J Adolesc Med Health. 2016;30(3).
20. Ravi R, Shah P, Palani G, Edward S, Sathiyasekaran BWC. Prevalence of Menstrual Problems among Adolescent School Girls in Rural Tamil. J Pediatr Adolesc Gynecol. 2016;29(6):571-6.
21. Adams Hillard PJ. Menstruation in adolescents: what do we know? And what do we do with the information? J Pediatr Adolesc Gynecol. 2014;27(6):309-19.
22. Yamamoto K, Okazaki A, Sakamoto Y, Funatsu M. The relationship between premenstrual symptoms, menstrual pain, irregular menstrual cycles, and psychosocial stress among Japanese college students. J Physiol. Anthropol. 2009;28(3):129-36.
23. Bae J, Park S, Kwon JW. Factors associated with menstrual cycle irregularity and menopause. BMC Women's Health. 2018;18(1):36.
24. Al-Agha AE, Jamal Aldeen RI, Tatwany BO. Pubertal Developmental Age among Saudi and Non-Saudi Young Females Living in Jeddah, Saudi-Arabia. Pediat Therapeut. 2015;5:2.
25. Keenan K, Culbert KM, Grimm KJ, Hipwell AE, Stepp SD. Timing and tempo: Exploring the complex association between pubertal development and depression in African American and European American girls. J Abnorm Psychol. 2014;123(4):725-36.

26. Su Y, Kong GL, Su YL, Zhou Y, LI-fang LV, Wang Q et al. Association of gene polymorphisms in ABO blood group chromosomal regions and menstrual disturbances. ETM. 2015;9:2325-30.

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