

# The Menstrual Cycle and Associated Symptoms amongst Spanish School Girls and Students

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## ABSTRACT

**Objective:** To study the menstrual cycle and the presence of premenstrual symptoms and dysmenorrhoea amongst Spanish schoolgirls and students.

**Methods:** Description of the characteristics of the menstrual cycle of 130 schoolgirls and students. Analysis of the link between variables using the  $\chi^2$  test of independence with a significance level of 5%. Magnitude of the link quantified through binary or multinomial logistic regression.

**Results:** Average age of the participants: 20 years old. Fifty-three per cent of cycles lasted 25–32 days. Eighty-eight per cent presented some premenstrual symptom and 98% dysmenorrhoea. The likelihood of a cycle of irregular length when compared to a cycle lasting less than 25 days is almost seven times greater in women aged between 17 and 20 as opposed to women aged between 21 and 25.

**Conclusion:** *Irregular cycles* were reported most frequently in women further away from the postmenarchal period. The risk of suffering premenstrual symptoms and dysmenorrhoea increased with age.

**Keywords:** Dysmenorrhoea, menstrual cycle, menstruation, premenstrual symptoms

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## INTRODUCTION

In general, the literature suggests that during the initial stages of female reproductive life menstrual cycles are not regular. It is stated that after menarche, length of cycles is highly variable and that fluctuations gradually disappear over an undefined period of time: length < 25 days, > 32 or more irregular. Barranco-Castillo *et al* (1) studied the length of 575 cycles registered by 72 women aged between 20–47 years, over a one-year period. They noted that regularity in the length of the cycle was the exception rather than the rule and that each woman may experience considerable fluctuation (10–28 days per year), moderate fluctuation (5–9 days per year) and low fluctuation (4 or less days per year). In all these cases ovulation had been checked as the subjects were users of the syntothermic contraception method. With regard to bleeding days, amongst the younger women the figure is  $\geq 6$  days and there was an inversely proportional relation between age and the presence of abnormal cycles and also between age and the length of bleeding (2–11). Moreover, throughout the cycle some women present physical, psychological and behavioural symptoms, included in the imprecise term “premenstrual syndrome” (12) with differing prevalence figures (from 33% to 97% according to the sources consulted). These symptoms may be perceived as mild, moderate or serious (6, 8, 12, 17). With regard to dysmenorrhoea, its frequency differs depending on the studies published (8, 18), its intensity may be mild, moderate or intense (6, 7, 19) and it is normally associated with long or irregular cycles (11). Non-steroidal anti-inflammatory drugs (NSAIDs), are the treatment of choice for dysmenorrhoea and are taken by more than half of the young women who suffer from it either occasionally or on a regular basis (4, 8), whereas others tend not to take medication (2, 8, 20). In Spain, with the exception of a publication by Dueñas *et al* (21) referring to a cohort study on premenstrual symptoms in women between

15 and 47, there are no other specific data available about the young, healthy population, from the postmenarche until the beginning of physical and emotional maturity.

The aim of the present study is to describe how menstrual cycles proceed in a group of young Spanish schoolgirls and students, in addition to studying the presence of dysmenorrhoea and premenstrual symptoms.

## **METHODS**

A pilot study was designed to study the menstrual cycle and associated symptoms amongst young students and pupils (12–25 years of age), recruited from three educational institutions (schools and university). The inclusion criteria were as follows: having menstruation, being aged  $\leq 25$  years, not being a user of hormonal contraceptives and not suffering from any gynaecological disease. They all received an anonymous questionnaire which had previously been validated and in which they were asked about their age, use of contraception, reproductive history, length of menstrual cycle, days of menstruation, presence and intensity of seven premenstrual symptoms (abdominal bloating, irritability, sadness, breast tenderness, tiredness, pain spreading down the legs, oedema in hands and feet) and dysmenorrhoea (mild, moderate, intense) and the medication used to alleviate such symptoms. All the participants signed an informed consent form and parental authorisation was obtained for participants who were not of full legal age. The statistical analysis has two sections. Firstly, there is a descriptive study of each variable and subsequently the identification of relations of dependence, paying special attention to the study of the association between age groups and third variables. For this reason, the Chi-squared test of independence was used (with a significance level of 5%). For those variables with a statistically significant relation, their

magnitude was studied and patterns were sought using binary or multinomial logistic regression models.

## **RESULTS**

The cooperation of 270 girls from three educational institutions (schools and university) was sought and they completed 150 questionnaires (which represents a 56% participation level and a 44% drop out rate). Finally, 19 cases (13%) were excluded because they failed to fulfil the inclusion criteria and/or because the data submitted was of insufficient quality. Finally, the analysis was based on a sample made up of 130 questionnaires with a total of 20 variables taken into account for each subject. The mean age of the participants was 20 (22% aged 12–16 years; 22% aged 17–20 years; 56% aged 21–25 years). All slept an average of 7.5 hours per night (SD 0.95%; CI 95% 7.38, 7.73). Eleven participants also devoted an average of ten hours per week to no academic activities (SD 7.77; CI 95% 4.78, 15.22). All were in good health except for three cases of thyroid disorder and one of anaemia. Half of the participants did not use contraception and the remaining half used male condoms (7% in the 12–16 year group and 61% in the 21–25 year group,  $p = 0.000$ ).

The length of the menstrual cycle was between 25 and 32 days in 54% of cases, regardless of the age group; 21% had irregular cycles; 14% of which lasted less than 25 days and 11% lasted more than 32 days. Ninety-three per cent of the participants complained of mild to moderate premenstrual symptoms, regardless of the age group ( $p = 0.462$ ); 88% stated that they suffered from at least one of the following symptoms: abdominal bloating (90%), irritability (77%), sadness (76%), breast tenderness (74%), tiredness (69%), pain spreading down the legs (22%), oedema in hands and feet (8%). The risk of suffering these symptoms increased with age (11% in the 12–16 age group and 57% in the 21–25 age group,

$p = 0.000$ ). The number of hours slept did not have any link with the presence of symptoms (8.14 hours for those who had symptoms and 7.42 for those who did not). Dysmenorrhoea was present in 98% of cases (36% mild, 38% moderate, 26% intense). Amongst the youngest participants (12–16 age group) only 19% complained of dysmenorrhoea and this was considered mild in 56% of those cases. In the older age group (21–25 years) dysmenorrhoea was present in 54% of participants and was described as mild by 37% and intense by 33%.

Table 1 reflects the link between age and the length of the menstrual cycle. For the three groups the most common response was that their cycles lasted between 25 and 32 days. Other responses depended on the age group to which they belonged ( $p = 0.005$ ).

Table 1. Relation between length of cycle and age

Length of cycle	Age groups	
	12–16 years	17–20 years
25–32 days	OR: 0.569	OR: 1.707
➤ 33 days	OR: 0	OR: 0.385
Irregular	OR: 1.458	OR: 6.875

Reference category "Age group" variable: 21–25 years

Reference category "Length of cycle" variable: < 25 days

As can be observed in Tables 2 and 3 the number suffering from breast tenderness, abdominal bloating or irritability compared to those who do not, increases with age, as does the intensity of dysmenorrhoea ( $p = 0.000$ ).

Table 2. Presence of premenstrual symptoms depending on age

Symptom	Age Group						<i>p</i> -value <sup>a</sup>
	12-16 years		17-20 years		21-25 years		
	n	%	n	%	n	%	
Breast tenderness	7	6.2	16	14.2	55	48.7	<i>p</i> = 0.000
Abdominal bloating	14	12.1	23	19.8	63	54.3	<i>p</i> = 0.015
Irritability	10	8.8	18	15.9	55	46.7	<i>p</i> = 0.015

<sup>a</sup>Obtained by applying the  $\chi^2$  test

Table 3. Relation between age and presence of three premenstrual symptoms

Symptom	Age Group	
	12–16 years	17–20 years
Breast tenderness	OR: 0.117	OR: 0.349
Abdominal bloating	OR: 0.190	OR: 0.730
Irritability	OR: 0.218	OR: 0.491

Reference category: 21–25 years

As can be seen in Table 4, the 21-25 age group presents the greatest risk of suffering dysmenorrhoea (of any level of intensity) in comparison to not suffering it. No relation was found between the presence of dysmenorrhoea and cycle length ( $p = 0.151$ ) or between the presence of dysmenorrhoea and the number of hours sleep ( $p = 0.331$ ). Neither was a relation found between the intensity of dysmenorrhoea and the consumption of paracetamol and NSAIDs (from 2.5 to 5 doses per day for all groups).

Table 4. Relation between intensity of dysmenorrhoea and age

<b>Intensity</b>	<b>Age Group</b>	
	<b>12–16 years</b>	<b>17–20 years</b>
Mild	OR:0.538	0.038
Moderate	OR:0.429	0.333
Intense	OR: 0.087	0.130

Reference category “Age group” variable: 21 – 25 years

Reference category “Intensity of dysmenorrhoea” variable: painless

## DISCUSSION

The results of this pilot study contribute some new elements. With respect to the length of the menstrual cycle, the group of participants closest to the menarche (aged 12–16 years) stated that their cycles were supposedly irregular. However, there was more likelihood of irregular cycles rather than one lasting less than 25 days in the 17–20 age group (OR 6.875) in comparison with the older group (21–25 years). This would be due to the adaptation process to which the girls are subject at this age, also reflected in the progressive use of contraception (9–12, 14, 16, 23) and the noticeable presence of the occasional premenstrual symptom, to a greater extent than reported by other authors (6, 9, 13, 14, 18, 24, 25), with the exception of Delara (15). In the our sample the risk of suffering one of the symptoms listed increased with age, especially breast tenderness, since the risk of suffering this is 8.5 times higher for women in the oldest age group (21–25 years.) compared to the participants in the youngest age group (12–16 years). This may be linked to psychological stress, but the questionnaire was not designed to study this issue. The oldest participants (21–25 years) were also at greater risk of dymenorrhoea, at any level of intensity, which is in line with previously published studies (8) and in accordance with adaptive changes, as pointed out by Shiferaw

(20). No link has been found between the length of the cycle and the intensity of dysmenorrhoea, contrary to Ju (11), who stated that the intensity of dysmenorrhoea was associated to irregular and long cycles (OR 2.02 and 1.46 respectively). More than 50% of the participants used NSAIDs to treat dysmenorrhoea, with a higher use frequency than appears in other studies (2–4, 7, 8, 18, 20), probably because the use of such medication depends on individual tolerance to pain. The relatively small sample size and the process used to recruit the participants could be considered as a possible bias of the study. Other issues, not covered by the questionnaire, should also be taken into account, such as age at menarche, size, weight and body mass index, which may be important, together with dietary habits and changes, all of which are aspects that were not explored. Neither were participants asked to give more specific information about the length of their cycle, with the result that the irregular cycle parameter is inaccurate because, as Barranco *et al* (1) have already shown, there may be extremely wide fluctuations in the length of the menstrual cycle over a one year period.

Nevertheless, this pilot study does allow us to draw some relevant conclusions (1.) Considering that 28-day cycles are the exception rather than the rule, many of the participants had presented normal cycles since menarche, which would contradict traditional statements about these cycles being irregular (2.) The presence of premenstrual symptoms is lower during the postmenarche years and increases with age, which is a very interesting finding that requires further research. (3.) The risk of suffering three of the most frequent premenstrual symptoms mentioned by the participants; breast tenderness, abdominal bloating, irritability-increases with age, as does dysmenorrhoea, which peaked in the over-21 group (4). The parents and those taking care of girls and young women should be aware of the range of normal events during the menstrual cycle, avoiding unnecessary medication during the early

stages of reproductive life. (5.) Our findings should be corroborated by recruiting more participants from the same and other population groups but within the same age ranges.

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### **Declaration of ethics and conflict of interests**

The Study Protocol was approved on the 28<sup>th</sup> of May 2012 by the Commission of Ethics of San Cecilio University Hospital (Granada, Spain). Everyone taking part signed an informed consent. R Martos, E Barrano, D Molina and A Bueno declare not to have a conflict of interests.

### **Contribution of the authors**

The protocol was conceived and designed by EB. Data collection was supervised by DM and RM. Statistical analysis and the final draft of paper was the work of EB, RM, DM and AB.

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