**INTRODUCTION**

Adolescence is roughly considered to be the period between 10 and 19 years of age. The adolescent experiences not only physical growth but also emotional, psychological, social, and mental changes.
Menarche is a milestone in a woman’s life as it denotes the start of reproductive capacity. Over the past 100 years, age at menarche has declined, the adolescent growth spurt has occurred at younger ages, and peak height growth velocity has increased.[1-8] Today, in many countries age at menarche ranges between 12 and 13 years.[1,3]

The length of the average menstrual cycle is 28 days, but the range of “normal” in adult women is wide, from 22-35 days. Menstrual cycles tend to be more irregular in young teenage women during the first few years after menarche, and again in the 40’s, during 3-5 years prior to menopause. A number of medical conditions can cause irregular periods, including thyroid disease, rapid gain or loss of weight, and virtually any significant chronic illness.[6]

In 75% of adolescents at the first gynecological year (one year after menarche), average menstrual cycle length is 21-45 days,[7] but by the third gynecological year, 60-80% of girls have menstrual cycles 21-35 days long, as adult women.[8] For a few years after menarche, several abnormalities of menstrual bleeding may distress the young girls.[9]

Therefore, healthcare providers have two main concerns: a) to timely detect conditions suggestive of significant pathologies, such as endometriosis, polycystic ovary syndrome, coagulation disorders, and eating disorders, which can have a major impact on women’s future reproductive or general health; b) to adequately support the girls to be confident and informed with their sexual health.

For an effective obstetric and gynecological healthcare, pediatricians and gynecologists stress the need for preventive health visits during adolescence, between the ages of 13 and 15 years, with subsequent annual clinic assessment, to begin a dialogue and establish a confidential setting where a girl can feel good and free to show her concerns on her own reproductive health. In some cases, this visit may be appropriate earlier, based on the concerns of the parents.[10] Care should be delivered according to the individual’s stage of physical, sexual, psychological, and cognitive development.[10]

The aim of this study is to provide support to young girls and their parents on girls’ physical development, referring to data defining ‘normal’ menarche and menstrual health. For the reproductive healthcare professionals, it is important to indicate what is expected in the first period, and what is the range of “normal” variation of cycle features in the subsequent menses.[8,10] Given that a number of external factors (nutritional, socioeconomic, and behavioral) have an impact on reproductive health timing and features, it is important to update information on menstrual pattern in adolescents.

This study aims to provide an updated picture of age at menarche and main menstrual cycle characteristics and complaints in an Italian population-based sample of adolescents attending secondary school.

**Materials and Methods**

**Sample population**

This cross-sectional multicenter study was conducted on a large sample of Italian secondary school girls, attending schools randomly chosen from 13 cities in northern Italy (Brescia, Bolzano, Ferrara, Modena, Novara, Padua, Parma, Pavia, Reggio Emilia, Torino, Trieste, Verona, and Vicenza) and three in southern Italy (Foggia, Lecce, and Taranto). Secondary schools were randomly selected from each city. Details of the sampling strategy have been published elsewhere.[11]

The girls were contacted at school, and those who had had menarche were recruited. All participants were informed about the nature, purpose, and procedures of the study, and informed written consent was obtained from the students and their legal guardians.

The procedures followed were in accordance with the ethical standards of the local institutional responsible committee on human experimentation and with the Helsinki Declaration.

Girls were asked to fill out a self-administered anonymous questionnaire prepared by a pediatric endocrinologist and a pediatric neuropsychiatrist from the Pediatric Unit of the University of Padua and was tested by the Department of Pediatrics.

In each school, the local investigator explained the aims of the survey and the questionnaire to the science teachers who explained and handed the questionnaire to their students to fill out.

Of the 6,924 questionnaires that were administered, 4,992 (71%) were collected. One hundred questionnaires were dropped because of incomplete information about girls’ birth date, and other 1109 questionnaires were excluded due to incomplete information about the date of first menses.

In the end, the questionnaires of 3,783 students who reported both their birth date and their menarcheal date were included in the data set.

**Variables**

The questionnaire includes questions about girls’ and family demographic details, anthropometry (weight,
The following definitions were used to describe menstrual cycle disorders: polymenorrhea was a menstruation interval lasting less than 21 days; oligomenorrhea occurs in intervals greater than 35 days. The latter choice depended on the observation that among girls, by the third gynecological year, about 80% of menstrual cycles are 21-35 days long, as is typical in adult women.\textsuperscript{8} Excessive bleeding length was defined as bleeding lasting more than 6 days.

Abdominal pain was ranked on four levels as follows: no or mild/moderate abdominal pain; severe abdominal pain without any use of drugs, or sufficient to limit the girl's activities; severe abdominal pain treated with drugs, and/or activity limitations during bleeding days; severe abdominal pain treated with drugs and/or activity limitations before bleeding days.\textsuperscript{13} The higher level was termed dysmenorrhea.

\textbf{Statistical analysis}

Descriptive analyses were performed on quantitative and qualitative variables for the total sample.

Mean values and standard deviations (SD) were calculated for quantitative variables; median age at menarche, and 95\%CI were evaluated. The prevalence of polymenorrhea, oligomenorrhea, and dysmenorrhea and of physical and psychological complaints was computed.

The normality of quantitative variables was verified by the Shapiro–Wilk test. Parametric and non-parametric one-way analyses of variance (ANOVA) were used to check differences between mean values of quantitative variables. The distributions of age at menarche across BMI levels were compared using Kolmogorov–Smirnov test.

Differences in proportions were analyzed using the chi square test or Fisher's exact test, as appropriate. Chi-square test was applied to compare monthly/seasonal distributions of menarche between Northern and Southern girls or across gynecological ages. Chi-square test was also applied to verify difference in menstrual cycle length, duration of bleeding, and premenstrual complaints across gynecological ages.

In evaluating the effects of covariates on menarcheal age, simple and multiple regression models using were applied. The multivariate model included the variables that were statistically associated with the age at menarche in the analysis using one covariate at a time: living area, parents’ birth area, girl’s BMI, family size, mother menarcheal age and age at data collection.

The same approach was applied to identify the variables associated with cycle abnormalities. Polymenorrhea, oligomenorrhea, irregular length, and bleeding lasting more than 6 days were used as outcomes in separate multivariable stepwise logistic models.

For polymenorrhea, oligomenorrhea, and irregular length, the following variables were entered in the models: social score, physical activity, living area, BMI, family size, smoke, pill use, drinking alcoholic beverages, living area, age at data collection, gynecological age, and bleeding > 6 days.

For bleeding lasting more than 6 days, the variables entered in the model were: social score, physical activity, living area, BMI, family size, pill use, smoke, drinking alcoholic beverages,
age at data collection, gynecological age, menstrual cycle length (as categorical: polymenorrhea/oligomenorrhea/irregularity vs. normal cycle length, 21-35 days).

The significance level was fixed at 0.05, and all tests were two-tailed. All the analyses were performed using the SAS statistical software release. 9.13 (SAS Institute, Cary, NC).

RESULTS

In total, 3,783 adolescent girls took part in the study. The demographic and clinical characteristics of the sample are described in Table 1. The mean age was 17.1 (SD 1.4) years and the mean BMI was 20.3 (SD 2.5) kg/m². Among girls, 5.0% belonged to families with low social score. Intense physical activity was declared by 9.7% of the girls, smoking habit by 30.3%, and drinking alcoholic beverage by 54.0%. Pill was used for contraception by 8.5% of girls, while 4.8% consumed the pill to regularize menses.

Menarche

The mean age at menarche was 12.4 (SD 1.3) years, and the median age was 12.4 years (95% CI - 12.34-12.46 years). Early menarche (≤10 years) occurred on 12.6% of the adolescents while late menarche (≥15 years) was declared by 2.3% of girls. Mean age at menarche of girls living in Southern cities was significantly lower than that of those living in Northern cities (12.17 ± 1.27 years vs. 12.44 ± 1.28 years; *P* < 0.0001); they also were significantly younger (16.7 ± 1.6 years vs. 17.2 ± 1.3 years; *P* < 0.0001). More details about onset of menses have been published in a previous paper.[13] Menarche occurrence showed two monthly peaks (*P* < 0.0001) of frequency in July-September and in December–January [Figure 1]. Monthly frequency marginally differed (*P* = 0.06) from previous data in Italy,[14] whilst no significant difference was found between North and South living areas (*P* = 0.43; data not shown). Moreover, no significant variation was seen in month at menarche according to month at birth (*P* = 0.60, data not shown). Menarche occurred with higher frequency in summer based on ages at onset of menarche, except for ages of 15 years or more [Figure 2]. Mean age at menarche was marginally different among seasons (spring: 12.32 ± 1.30 years; summer: 12.46 ± 1.28 years; autumn: 12.45 ± 1.27 years; winter: 12.38 ± 1.26 years; *P* = 0.08).

The mean and median age at menarche by BMI groups is detailed in Table 2. The data show significant differences with menarcheal age progressively declining from 12.8 years for subjects with BMI < 18.5 kg/m² to 11.7 years for overweight/obese subjects (BMI ≥ 25 kg/m²), even though mean chronologic age was comparable between groups. In Figure 3, the cumulative distribution of age at menarche is compared among the four BMI groups (*P* = 0.05).

For the total sample, in simple regression model analysis, mothers’ menarcheal age was significantly and positively associated with the girls’ age at menarche (*P* < 0.0001). Living area (*P* < 0.0001), parents’ birth area (*P* < 0.0001), family size (*P* = 0.008) also significantly associated with age at menarche. Meanwhile, no relationship was observed between menarcheal age and social level, physical activity, or birth order (data not shown).

The results of different multiple regression models that evaluated the independent predictive role of the variables

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Table 1: General characteristics of 3,783 girls attending secondary school

|                          | n  | %   | Mean±SD | Range |
|--------------------------|----|-----|---------|-------|
| Age at data collection (years) | 3783 | 17.1±1.4 | 14-21   |
| Living area              | 3675 |     |         |       |
| North                    | 3218 | 87.6 |         |       |
| South                    | 457  | 12.4 |         |       |
| Parents’ birth area      | 3599 |     |         |       |
| Both from North          | 2186 | 60.7 |         |       |
| One from North and one from South | 651 | 18.1 |         |       |
| Both from South          | 762  | 21.2 |         |       |
| BMI (kg/m²)              | 3549 |     | 20.3±2.5 | 13.0-37.9 |
| <18.5                    | 823  | 23.2 |         |       |
| 18.5–20.0                | 967  | 27.3 |         |       |
| 20.1–25.0                | 1601 | 45.1 |         |       |
| >25.0                    | 155  | 4.4  |         |       |
| Family size (n)          | 3736 |     | 4.0±0.9 | 2-11   |
| ≤3                       | 967  | 25.9 |         |       |
| 4                        | 1972 | 52.8 |         |       |
| ≥5                       | 797  | 21.3 |         |       |
| Social score (range 0-14) | 3473 |     | 9.5±3.1 | 2-14   |
| Low (0-4)                | 175  | 5.0  |         |       |
| Middle (5-8)             | 1155 | 33.3 |         |       |
| High (9-12)              | 1493 | 43.0 |         |       |
| Very high (≥13)          | 658  | 18.7 |         |       |
| Physical activity        | 3783 |     |         |       |
| No-low (<2 hours/week)   | 1834 | 48.5 |         |       |
| Moderate (2-6 hours/week)| 1580 | 41.8 |         |       |
| Intense (>6 hours/week)  | 369  | 9.7  |         |       |

SD: Standard deviation, BMI: Body mass index

Figure 1: Monthly distribution of menarche. Results from the present study are compared (*P* = 0.06) with previous data in Italy (Gueresi, 1997; Ref. 14)
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Table 2: Mean (±SD) and median (inter quartile range) of age at data collection, BMI, and age at menarche by BMI group

| BMI (kg/m²) | <18.5 N=823 | 18.5-19.9 N=970 | 20.0-25.0 N=1601 | >25.0 N=155 |
|-------------|-------------|-----------------|------------------|-------------|
| Age at data collection* (years) | | | | |
| Mean±SD | Median | Mean±SD | Median | Mean±SD | Median | Mean±SD | Median |
| 17.0±1.4 | 17.1 | 17.1±1.3 | 17.2 | 17.2±1.3 | 17.2 | 17.2±1.5 | 17.4 |
| BMI** (kg/m²) | | | | |
| Mean±SD | Median | Mean±SD | Median | Mean±SD | Median | Mean±SD | Median |
| 17.5±0.8 | 17.7 | 19.3±0.4 | 19.3 | 21.7±1.3 | 21.5 | 27.3±2.3 | 26.7 |
| Age at menarche** (years) | | | | |
| Mean±SD | Median | Mean±SD | Median | Mean±SD | Median | Mean±SD | Median |
| 12.7±1.2 | 12.8 | 12.5±1.2 | 12.5 | 12.3±1.3 | 12.3 | 11.9±1.4 | 11.7 |

*P=0.11, **P<0.0001, SD: Standard deviation, BMI: Body mass index

Figure 2: Seasonal distribution of menarche, by age at menarche

Figure 3: Cumulative distribution of age at menarche by BMI groups (P: 0.05)

In the model including all the potential predictors, the mother’s menarchal age alone explained about 10% of the total variance (about 14%). Living area was the only variable that was not confirmed to have an independent association with the age at menarche (P = 0.13).

Menstrual cycles abnormalities and complaints

With regards to menstrual cycles abnormalities [Table 4], polymenorrhea was present in 2.5% of the girls, oligomenorrhea in 3.7%, and irregularity in 8.3% of the whole sample. About 27.9% of adolescents declared to have experienced irregularity in the recent past, while this proportion grew to 72.8% when observation was extended to the period since menarche. Additional details on menstrual irregularities have been published previously.[13]

To describe differences across gynecological age, menstrual cycle and bleeding length along with perimenstrual disturbances are shown in Table 5. The prevalence of oligomenorrhea significantly declined from over 9% to about 3% at the second gynecological year. Polymenorrhea decreased from 5.9% to about 2.0% even in the first year since menarche. Blood flow lasting more than 6 days was found in about 19.6% of girls. Among premenstrual disturbances, dysmenorrhea, mood changes, irritability, and headache showed consistently higher prevalence at least at 5 years since menarche.

In Table 6, the results from different multiple logistic regression models (stepwise procedure) are shown. In each model, a menstrual abnormality is used as dependent condition, whilst more family and individual characteristics were tested for being independently associated.

As shown, polymenorrhea was only associated with gynecological age (OR = 0.86, 95%CI: 0.75-0.99). Both oligomenorrhea and irregular length associated with pill use (OR = 0.48, 95%CI: 0.25-0.90; OR = 0.63, 95%CI: 0.51-0.79, respectively); gynecological age (OR = 0.71, 95%CI: 0.60-0.83; OR = 0.81, 95%CI: 0.77-0.85, respectively); bleeding length (OR = 2.06, 95%CI: 1.35-3.14; OR = 2.03, 95%CI: 1.68-2.45, respectively). In addition, oligomenorrhea was associated with age at data collection (OR = 1.25, 95%CI: 1.02-1.53).

Long lasting bleeding (>6 days) was significantly and inversely associated with family social level (OR = 0.94, 95%CI: 0.80-1.00) and pill use (OR = 0.66; 95%CI: 0.52-0.85). Conversely, it was significantly and positively associated with oligomenorrhea (OR = 2.36, 95%CI: 1.55-3.60) and...
irregularity (OR = 2.59; 95%CI: 1.95-3.44) compared to normal cycle length (21–35 days). Neither gynecological age nor BMI were significantly associated with bleeding excess.

**DISCUSSION**

This study provides an update of knowledge about the onset of menstrual cycle and menses features among secondary school girls in Italy. The date of first menses was retrospectively collected from girls attending secondary school, who had already had their first menses. The information was self-reported by girls through a structured questionnaire. The mean age of the girls was 17.19 years (SD = 1.42), and only 6.2% of the girls were older than 18 years. The short time between the event and the data collection allows to be confident on limiting the recall bias.

**Age at menarche**

The results indicated that the median age for all the girls at menarche was 12.40 years. Our results on age at first period are comparable to those produced by previous studies on Italian girls,[14,16] confirming that 95% of Italian girls have menarcheal age ranging from 10 to 15 years. Comparisons, adjusted for age at data collection, suggest that living area (North vs. South) is not an independent marker.

During the past century, age at menarche has shown a constant and gradual decrease in many countries around the world. In Europe and United States, each decade accounted for a mean anticipation of about 2-3 months.[17] Recently, several studies showed a stabilization of the menarcheal age at 12-13 years.[8,11,18-21] The estimated menarcheal age found in the present study is largely consistent with findings from other countries,[22] suggesting that in Italy menarcheal age is leveling off.

**Table 4: Menstrual cycle features among girls attending secondary school**

|                | n   | %     |
|----------------|-----|-------|
| Cycle length   |     |       |
| Polymenorrhea<21 days | 90  | 2.5   |
| Normal length 21-35 days | 3024 | 85.5  |
| Oligomenorrhea>35 days | 130 | 3.7   |
| Irregular length | 295 | 8.3   |
| Polymenorrhea in the past | 1131/3321 | 34.1 |
| Normal length in the past | 1843/3457 | 53.3 |
| Oligomenorrhea in the past | 1019/3655 | 27.9 |
| Irregularity in the recent past | 2531/3475 | 72.8 |
| Blood flow (days)  |     |       |
| <4              | 105 | 2.8   |
| 4–6             | 2918| 77.6  |
| >6              | 738 | 19.6  |

**Table 3: Results from different multiple linear stepwise regression models with age at menarche as dependent variable and general and family characteristics as risk factors**

|                      | Living area* | Parents’ birth area* | BMI (kg/m²) | Family size* | Mother’s menarcheal age (years) | Age at data collection (years) |
|----------------------|--------------|----------------------|-------------|--------------|---------------------------------|-------------------------------|
| Model 1              | Estimate     | −0.10                | −0.11       | −0.09        | 0.09                            | 0.09                          |
|                      | Standard error | 0.08                | 0.03        | 0.009        | 0.03                            |                               |
|                      | P            | 0.21                 | 0.001       | <0.0001      | 0.0003                          |                               |
| Model 2              | Estimate     | −0.20                | −0.08       | −0.08        | 0.09                            | 0.23                          |
|                      | Standard error | 0.08                | 0.04        | 0.009        | 0.03                            | 0.01                          |
|                      | P            | 0.02                 | 0.02        | <0.0001      | 0.0004                          | <0.0001                       |
| Model 3              | Estimate     | −0.13                | −0.07       | −0.08        | 0.07                            | 0.23                          |
|                      | Standard error | 0.09                | 0.03        | 0.009        | 0.03                            | 0.01                          |
|                      | P            | 0.13                 | 0.03        | <0.0001      | 0.0004                          | <0.0001                       |

*The following predictors were tested by means of multiple linear stepwise regression models: social level, physical activity, birth order, living area, parents’ birth area, BMI, family size, mother’s menarcheal age, age at data collection. *Living area: 0: North, 1: South; Parents’ birth area: 0: Both from North, 1: One from North and one from South, 2: Both from South; Family size: number of people in the family, BMI: Body mass index.
Nevertheless, our data showed that living area (North vs South) was not significantly associated with age at menarche and a similar monthly pattern of age at menarche in Northern and Southern Italy was found. Given that Italy stretches from 47°N to 35°N latitudes, the irradiation varies accordingly from North to South in an increasing trend (global horizontal annual radiation 1350 kWh/m² at North and 1500 kWh/m² at South), and seasonality is more pronounced at North, differently from other studies.[27] This survey suggests that latitude and radiation dose may not be associated with age at menarche in Italy. In addition, our results indicated that neither social level nor body mass is associated with seasonal menarche peaks (data not shown). Moreover, in contrast with Matchock and colleagues[28] our data did not confirm any relationship between birth month and monthly pattern (data not shown). In the picture described by the results of the present study, the hypothesis, sustained by Park and colleagues[29] for Korean girls, that monthly peaks in age at menarche may be mainly associated with psychological stress levels induced by school activity, is credible in Italy as well. In fact, our survey showed that menarche is more common in those months that coincide with periods of school vacation in Italy (June-September and December-January).

Inconsistently with other studies,[14,28] we find that late menarche did not occur in preferential months or seasons, suggesting that physiopathological mechanisms may prevail over any other possible factors privileging a specific season.

### Factors associated with age at menarche

The decreasing trend of age at menarche observed in the past has been largely attributed to improvement in socioeconomic conditions and in food availability, which would contribute to ameliorate the children nutritional status.[22,30-32] Research supports the hypothesis that a critical fat mass is necessary for menarche to occur.[33] In the present study, the current BMI, calculated from self-reported weight and stature at the time of the survey, was used as a surrogate

**Table 5: Menstrual cycle duration and blood flow length, by gynecological age**

| Gynecological age (years) | Number | <1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | ≥7 | P |
|---------------------------|--------|----|---|---|---|---|---|---|---|----|---|
| Cyclometric length (%)   |        |    |   |   |   |   |   |   |   |    |   |
| Polymenorrhea (<21 days) | 5.9    | 2.0| 2.1| 4.2| 2.6| 1.7| 1.8| 2.7| 1.7| <0.0001 | |
| Normal (21-35 days)      | 70.6   | 75.0| 81.9| 80.5| 88.0| 87.6| 89.0| 92.4| 89.7 | |
| Oligomenorrhea (>35 days)| 9.8    | 9.9| 3.3| 4.6| 2.8| 3.1| 3.1| 1.1| 2.6 | |
| Irregular length         | 13.7   | 13.2| 12.7| 10.8| 6.6| 7.6| 6.1| 3.8| 6.0 | |
| Blood flow lasting (%)   |        |    |   |   |   |   |   |   |   |    |   |
| <4 days                  | 3.6    | 3.7| 2.4| 2.7| 2.0| 3.0| 3.1| 4.7| 2.5 | |
| 4-5 days                 | 53.6   | 36.2| 52.1| 51.9| 52.9| 52.3| 54.4| 60.5 | |
| 6 days                   | 23.2   | 33.7| 26.5| 24.8| 25.7| 25.8| 22.5| 23.8| 19.3 | |
| >6 days                  | 19.6   | 26.4| 19.0| 20.7| 19.5| 18.9| 20.0| 15.0| 17.5 | |
| Premenstrual symptoms (%)|        |    |   |   |   |   |   |   |   |    |   |

**Table 6: Results from different multiple logistic stepwise regression models with menstrual abnormalities as dependent variable and general and family characteristics as covariates**

| Menstrual abnormality dependent | Covariate | OR | 95% CI | P |
|--------------------------------|-----------|----|--------|---|
| Polymenorrhea                  | Gynecological age (y) | 0.86 | 0.75-0.99 | 0.04 |
|                                | Pill use   | 0.48 | 0.25-0.90 | 0.02 |
|                                | Age at data collection (y) | 1.25 | 1.02-1.53 | 0.0001 |
|                                | Oligomenorrhea | 0.71 | 0.60-0.83 | <0.0001 |
|                                | Gynecological age (y) | 0.71 | 0.60-0.83 | <0.0001 |
|                                | Bleeding>6 days | 2.06 | 1.35-3.14 | 0.0008 |
|                                | Irregular length | 0.63 | 0.51-0.79 | <0.0001 |
|                                | Gynecological age (y) | 0.81 | 0.77-0.85 | <0.0001 |
|                                | Bleeding>6 days | 2.03 | 1.68-2.45 | <0.0001 |
|                                | Polymenorrhea vs. ref | 0.98 | 0.52-1.84 | 0.10 |
|                                | Oligomenorrhea vs. ref | 2.36 | 1.55-3.60 | 0.02 |
|                                | Irregular length vs. ref | 2.59 | 1.95-3.44 | 0.0003 |

*The following covariates were tested by means of different multiple logistic stepwise regression models. For polymenorrhea, oligomenorrhea, and irregular length: social score, physical activity, living area, BMI, family size, smoke, pill use, drinking alcoholic beverages, living area, age at data collection, gynecological age, bleeding >6 days. For Bleeding lasting more than 6 days: Social score, physical activity, living area, BMI, family size, pill use, smoke, drinking alcoholic beverages, age at data collection, gynecological age, Polymenorrhea/Oligomenorrhea/Irregularity vs. Normal cycle length (21-35 days). OR: Odds ratio CI: Confidence interval
of the nutritional status of the girl at menarche, assuming that in absence of diseases, nutritional conditions track from childhood BMI to adulthood. Moreover, previous studies had verified a large agreement between BMI and the body-silhouette among adolescents,[34] Despite this approximation, in accordance with evidence from literature, this survey confirms the significant association between larger body-silhouette and earlier menarche [Figure 3], with overweight (BMI > 25 kg/m²) girls having earlier menses about 10 months earlier than underweight girls do (BMI < 18.5 kg/m²). Also, after adjusting for other significant covariates (parents’ birth area, family size, mother’s menarcheal age, and adolescent’s age at data collection) the relationship was confirmed (P < 0.0001).

The final multiple regression model includes the main relevant covariates suggested by results from literature: Mother’s menarcheal age (representing part of the genetic determinant), parents’ birth area (that is a proxy for genetic and cultural factors), adolescent’s age at menarche, which is a consequence of the study design (given that only girls who already had menarche were included; the total of younger girls had menarche early; meanwhile, only a part of the older girls may have had menarche early).

Cycle length and blood flow length
Our results indicate that [Table 5] that by the mean age of 17.1 years, 2.5% of the girls had cycles shorter than 21 days and in 3.4% they were longer than 35 days. A shorter than normal bleeding period (<4 days) was reported by 3.2% of the whole sample, and a long bleeding period (>6 days) by 19.6% of the girls.

As expected, regularization was seen for girls showing abnormalities in the first years after menarche. Despite this, the prevalence of polymenorrhea persisted with similar levels since the second gynecological year (about 2%). Anovulatory cycles with unopposed estrogen stimulation may lead to endometrial abnormalities in the lives of many adolescent women, it is noteworthy that this particular age group is still often neglected. Traditionally, education about menstruation and puberty was a part of the maternal role. Physicians are generally expected sources of trustworthy information about menses, but they are often uncomfortable with discussing the topic of menstruation and sexuality in general.

Healthcare providers have an immense importance for these adolescent girls who are going through pubertal transition because have an opportunity to discuss reproductive health issues with mothers and their daughters, to make an early diagnosis, and to choose an appropriate treatment, thus minimizing the negative outcomes caused by these disorders in the lives of adolescents.

Many of the menstrual dysfunction problems can be effectively handled by the well-trained general clinician. Specific, complex situations should be referred to the appropriate specialist (gynecologist or endocrinologist), preferably someone skilled with adolescents’ issues.

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**APPENDIX - KORB WORKING GROUP**

The authors of this paper performed the present study on behalf of all the members of the KORB (Kids Observatory Research Board) working group: Sergio Bernasconi, Luigi Bianchin, Gianni Bona, Mauro Bozzola, Fabio Buzi, Carlo De Sanctis, Vincenzo De Sanctis, Giorgio Radetti, Franco Rigon, Luciano Tatò, Giorgio Tonini, and Egle Perissinotto.