Dysmenorrhea is the most common gynaecological problem among young females. In Arabic countries, few studies on gynaecological problems of adolescent’s girls were published. Objective: the aim of the study was to determine the prevalence of dysmenorrhea and associated factors among adolescents in public schools at Marrakesh. Methods: we conducted a cross-sectional study; our data was collected via a questionnaire and the statistical analysis was done using SPSS version 21. Our random sample counted 364 post-menarcheal girls aged between 12 and 20 years who participated voluntarily in our study. Results: the mean age at menarche was 12.89 ± 1.34 years; the prevalence of dysmenorrhea was 78% and 58.1% of them suffering from severe dysmenorrhea that increased clearly with the chronological age. Dysmenorrhea was cause for missing school among 13% of girls and the most common symptoms associated with it were backache, fatigue, irritability and anxiety. The gynecological age was found to be the only predictive factor of dysmenorrhea among schoolgirls. Conclusion: reproductive health education should be improved enough by including them in the school curriculum to prepare girls for menstruation and inform them about problems related to this phenomenon, especially dysmenorrhea.

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In Morocco as in Arab countries, characteristics of the menstrual cycle among adolescents' girls especially are not commonly studied. From our research of literature, only one article that was published in 1999 by Montero (Montero et al., 1999) addressing this problem in Morocco. We found there were also other studies conducted in the Medical College of Casablanca and Marrakesh that were not published. Knowing the prevalence of dysmenorrhea is important because it is a considerable public health problem. In this study, our aim was to determine the prevalence of dysmenorrhea, accompanied symptoms and the major predictors of these phenomena.

2. Methods

It was a descriptive cross-sectional study conducted in Marrakesh city (Morocco). The size of our sample was determined by using:

\[ N = \frac{t^2 \cdot (p \cdot (1 - p))}{m^2} \]

\( t = \) level of confidence fixed at 95% (1.96); \( p = 69.5\% \) is the proportion of dysmenorrhea found among female girls in Marrakesh (69.5%) (Montero et al., 1999); \( m = \) margin of error 5%. Calculated size: 326 majorated at 364 post-menarcheal girls.

This study conducted in five different public middle and secondary schools of the urban area (Marrakesh city); the choice of the schools was made randomly. Data was collected during the school year 2016–2017 (from February to May 2017) using an anonymous questionnaire. The questionnaire included demographic information (e.g., age, age at menarche, gynecological age) and they asked also about dysmenorrhea during the previous 6 months, bleeding flow, bleeding duration, cycle length, severity, duration of dysmenorrhea and associated symptoms.

Age at menarche was determined by retrospective method and the gynecological age was computed as a difference between age at the survey and the age at menarche.

To measure the participants' severity of dysmenorrhea, we had utilised a categorical rating scale. The participants were asked to rate the degree of pain by making a mark on line. The scores obtained from the scale were classified into mild dysmenorrhea (I) if it was between 1 and 3 points, moderate (II) between 4 and 7 points and severe (III) between 8 and 10 points (Larroy, 2002).

To determine the symptoms that accompanied dysmenorrhea during the last six months, we had advised a mini questionnaire containing a list of the most common physical-behavioural and psychic symptoms; each participant checked those relevant to them.

To measure the bleeding flow, participants were asked to fill a Pictorial Blood Loss Assessment Chart (PBAC) mini questionnaire for one menstruation then we obtained a Higham score (Higham et al., 1990). Bleeding was classified as normal with a score of less than 100 and heavy bleeding with a score of more than 100.

Data were analysed using SPSS (version 21). We did descriptive analysis (frequencies and percentage); test chi-deux, correlation Pearson were utilised to evaluate associations between variables. Logistic regression analysis was utilised to estimate the predictors of dysmenorrhea.

Ethical permission from high educational institutions was taken; we had obtained also the authorization of school principals. All participants were informed about the procedure and aims of this study and they were assured that all information obtained are confidential and secure. They responded to our study voluntarily, and their anonymity was assured by assessing each of them by a code number useful in analysis process. The Informed consent was obtained from all individual participants included in the study.

3. Results

The means age of the respondent and their age at menarche were respectively 16.65 ± 1.83 years and 12.89 ± 1.34 years. Table 1 shows the distribution of the sample according to the characteristics of the menstrual cycle. Most of the adolescent girls (64.3%) had a duration of bleeding between 4 and 7 days. More than three quarters of participants (78.2%) who knew their cycle duration reported that it lasted between 21 and 35 days. A quantity of bleeding more than 80 ml was observed among most of participants (62.6%). Most respondents (75.8%) observed the presence of clots during bleeding while approximately half of the respondents (52.5%) declared had an overflowing menses. The prevalence of dysmenorrhea was 78% among our population. Regarding knowledge about menstruation, we noted that approximately half of schoolgirls (51.9%) had information about menstrual cycle.

Univariate analysis for presence or absence of dysmenorrhea (Table 2) revealed an association between the presence of dysmenorrhea and chronological age (p < 0.001), gynecological age (p < 0.001), duration of bleeding (p < 0.05), the flow of bleeding (p < 0.05) and the presence of clots (p < 0.05).

Table 3 shows the characteristics related to dysmenorrhea. The intensity of dysmenorrhea was a law among 10.2% of participants while more than half of the participants (58.1%) had qualified their pain as severe. We can notice that 13% of dysmenorrheic participants had missed school days. When we had asked participants to describe the evolution of pain since menarche, the most of them (35.9%) declared having increasing pain or in perpetual change (32.7%). More than half of the participants (62.7%) declared that their pain severity change throughout seasons and the majority of them (79.2%) felt more pain during winter. Medical visit in private or public clinic observed among 10.6% of participants and more than half of participants (57.7%) used treatments for calm their pain.

Table 4 shows the variation of the intensity and duration of dysmenorrhea according to selected variables. Regarding the intensity of dysmenorrhea, we can notice there was a positive correlation between the intensity of dysmenorrhea and the chronological age (P < 0.001), the gynecological age (p < 0.001), the duration of

| Characteristics of menstrual cycle | Frequency | %  |
|-----------------------------------|-----------|----|
| Duration of menses (days)         |           |    |
| <4                                | 27        | 7.4|
| 4–7                               | 234       | 64.3|
| >7                                | 103       | 28.3|
| Lenght of cycle in days (n = 165) |           |    |
| <21                               | 13        | 7.9|
| 21–35                             | 129       | 78.2|
| >35                               | 23        | 13.9|
| Menstrual bleeding                |           |    |
| ≤80 ml (≤100 Higham score)        | 228       | 62.6|
| <80 ml (<100 Higham score)        | 136       | 37.4|
| Presence of clots                 |           |    |
| Yes                               | 276       | 75.8|
| No                                | 88        | 24.2|
| Overflowing                       |           |    |
| Yes                               | 173       | 47.5|
| No                                | 191       | 52.5|
| Dysmenorrhea                      |           |    |
| Yes                               | 284       | 78  |
| No                                | 80        | 22  |
| Information about menstrations    |           |    |
| Yes                               | 189       | 51.9|
| No                                | 175       | 48.1|
menses (p < 0.05), the flow of bleeding (p < 0.001) and with the length of the menstrual cycle (p < 0.05). We can observe also that the more dysmenorrheic pain increase the more participants tend to have a medical visit for their dysmenorrhea (p < 0.001) and they more tend to use treatment to calm their pain (p < 0.001).

The duration of dysmenorrhea was positively correlated to the age of menarche (p < 0.05). We can also observe that participants whose pain duration is longer were more likely to have a medical visit for their dysmenorrhea (p < 0.05).

Respondents with dysmenorrhea reported various physical and psychological symptoms (Fig. 1). The most common somatic symptoms (a) were backache (22.2%), fatigue (12.9%) and breast tenderness (12.9%). While the most commons psychic symptoms (b) were irritability (26.4%), anxiety (20.7%) and sudden change of humour (20.5%).

### Table 2
Univariate analysis for independents variables related to dysmenorrhea.

| Characteristics                        | No (n = 80)  | Yes (n = 284) | P-value |
|----------------------------------------|--------------|---------------|---------|
| **Moyen ± Ecart Type**                 |              |               |         |
| Age (Years)                            | 15.39 ± 1.95 | 16.38 ± 1.8   | P*<0.001|
| Age at menarche (years)                | 13.17 ± 1.35 | 12.84 ± 1.34  | P = 0.084|
| Gynecological age (Years)              | 2.67 ± 2.02  | 4.03 ± 2.08   | P*<0.001|
| Duration of menses (Days)              | 5.20 ± 1.78  | 5.62 ± 1.34   | P*<0.05  |
| Menstrual bleeding (Higham score)      | 122.95 ± 96.82 | 144.59 ± 80.37 | P*<0.05  |

| Presence of clots                     |              |               |         |
|---------------------------------------|--------------|---------------|---------|
| Yes                                   | 3(19.2%)     | 223(80.8%)    | P*<0.05 |
| No                                    | 27(30.7%)    | 61(69.3%)     |         |

| Overflowing                           |              |               |         |
|---------------------------------------|--------------|---------------|---------|
| Yes                                   | 33(19.1%)    | 140(80.9%)    |         |
| No                                    | 47(24.6%)    | 144(75.4%)    | 0.208   |

| Length of cycle (Days) (n = 165)       |              |               |         |
|---------------------------------------|--------------|---------------|---------|
| Yes                                   | 31.55 ± 20.13 | 33.51 ± 17.76 | P = 0.581|
| No                                    |              |               |         |

| Physical activity (Sport)              |              |               |         |
|---------------------------------------|--------------|---------------|---------|
| Yes                                   | 32(25.4%)    | 94(74.6%)     | P = 0.287|
| No                                    | 48(20.2%)    | 190(79.8%)    |         |

Table 3
Distribution of adolescent girls according the characteristics of dysmenorrhea.

| Characteristics of dysmenorrhea | Frequency | %    |
|---------------------------------|-----------|------|
| **Intensity of dysmenorrhea**   |           |      |
| Low                             | 29        | 10.2 |
| Moderate                        | 90        | 31.7 |
| Severe                          | 165       | 58.1 |

| Missing school day due to dysmenorrhea | Frequency | %    |
|---------------------------------------|-----------|------|
| Yes                                   | 37        | 13   |
| No                                    | 247       | 87   |

| Evolution of pain since menarche     | Frequency | %    |
|--------------------------------------|-----------|------|
| Decreasing                           | 29        | 10.2 |
| Increasing                           | 102       | 35.9 |
| In perpetual change                  | 93        | 32.7 |
| No change                            | 60        | 21.1 |

| Change of pain severity throughout seasons | Frequency | %    |
|--------------------------------------------|-----------|------|
| Yes                                        | 178       | 62.7 |
| No                                         | 106       | 37.3 |

| During which season you feel more pain (n = 178) | Frequency | %    |
|-------------------------------------------------|-----------|------|
| Winter                                          | 141       | 79.2 |
| Summer                                         | 37        | 20.8 |

| Did dysmenorrhea bring you to the hospital?     | Frequency | %    |
|------------------------------------------------|-----------|------|
| Yes                                            | 30        | 10.6 |
| No                                             | 254       | 89.4 |

| Use treatment for dysmenorrhea                 | Frequency | %    |
|------------------------------------------------|-----------|------|
| Yes                                            | 164       | 57.7 |
| No                                             | 120       | 42.3 |

Table 5 reported that girls who had experienced dysmenorrhea had more chances of developing psychic symptoms ($X^2 = 13.28$; $ ddl = 1; OR = 0.74; CI at 95%; P < 0.001) and somatic symptoms ($X^2 = 35.74; ddl = 1; OR = 0.66; CI at 95%; P < 0.001). There was a significate correlation between dysmenorrhea and the presence of clots ($X^2 = 5.127; df = 1; p = 0.019$).

Logistic regression analysis of significant variables associated with dysmenorrhea (independent variables) indicate that the only predictive factor of dysmenorrhea was the gynecological age (Table 6).

### 4. Discussion

This study highlights the prevalence of dysmenorrhea and factors related to it among schoolgirls in Marrakesh city. In literature, the prevalence of dysmenorrhea has been reported to be 60%–93% commonly reported for the same age group (Derman et al., 2004; Wong and Khoo, 2010). Our finding, 78%, falls within the range reported in the literature with a varying degree on intensity which is lower than rate find among Iranian adolescent’s schoolgirls (82.5%) (Pakniat et al., 2019) and in Omani female adolescents (94%) (Al-Kindi and Al-Bulushi, 2011). It was approximately similar with the rates reported in Saudi Arabian female adolescents (74.4%) (Abd El-Mawgod et al., 2016), Egyptian female adolescents (75%) (Mohamed, 2012) and Italian schoolgirls (76%) (Zannoni et al., 2014). This variation in prevalence may be due to differences in the ranges of age, respondent’s socio-cultural status and pain perception. In the present study, we found dysmenorrhea to be more severe among 58.1% of respondents which is higher than that reported among Egyptian adolescents’ girls (41.4%) (Eman, 2012), Omani schoolgirls (32%) (Al-Kindi and Al-Bulushi, 2011), Saudi schoolgirls (37.5%) (Abd El-Mawgod et al., 2016) and Australian teenagers (21.2%) (Parker et al., 2010), but it was approximately similar to what was reported in Bangladesh (De Sanctis et al., 2016). The feeling of discomfort (physical and emotional) that plague girls at the period of menstruation, may lead them to perceive the pain as severe. On the other hand, some previous studies reported that pain perception and expression of pain is influenced by genetic, psychological, developmental, familial, social and cultural factors (Edwards et al., 2001; Mannion et al., 2007).

Dysmenorrhea is reported to be accompanied by physical, behavioural and psychological symptoms. The most common physical
and behavioural symptoms associated with dysmenorrhea were backache, fatigue, appetite change, breast tenderness and legs pain. Furthermore, dysmenorrhea was reported to be in association with mood disorders (Gagua et al., 2012). Our study corroborates this as more than third (78.9%) of girls that have dysmenorrhea surfing of menstrual psychic symptoms. In fact, irritability, anxiety and sudden change in mood were the most commons symptoms. A study conducted in Egypt by El-Gilany (El-Gilany et al., 2005) reported

Table 4

| Intensity of dysmenorrhea | p-value | Duration of dysmenorrhea | p-value |
|---------------------------|---------|--------------------------|---------|
| Low | Moderate | Severe | 048H | ≥048H |
| Age (Years) | 16.36 ± 1.85 | 16.56 ± 1.99 | 17.15 ± 1.54 | P* < 0.001 | 16.92 ± 1.77 | 16.85 ± 1.74 | P = 0.760 |
| Gynecological age (Years) | 2.99 ± 1.61 | 3.69 ± 2.13 | 4.44 ± 1.59 | P* < 0.001 | 3.86 ± 1.99 | 4.16 ± 2.08 | P = 0.226 |
| Age at menarche (Years) | 13.36 ± 1.46 | 12.87 ± 1.34 | 12.72 ± 1.31 | P* < 0.05 | 13.06 ± 1.32 | 12.69 ± 1.33 | P* < 0.05 |
| Duration of menses (Days) | 5 ± 1 | 5 ± 1 | 6 ± 1 | P* < 0.005 | 5.31 ± 1.30 | 5.80 ± 1.34 | P* < 0.05 |
| Bleeding flow (Higham score) | 124 ± 56 | 118 ± 68 | 163 ± 86 | P* < 0.001 | 137.88 ± 73.75 | 148.71 ± 84.1 | P = 0.271 |
| Cycle length (Days) | 44 ± 28 | 33 ± 13 | 32 ± 18 | P* < 0.05 | 33.62 ± 18.88 | 33.44 ± 17.15 | P = 0.955 |

Medical visit

| Yes | No |
|-----|----|
| 9(10.4%) (100%) | 1(3.3%) | 1(3.3%) | 29(96.7%) | P* < 0.001 | 6(20%) | 24(80%) | P* < 0.05 |

Treatment use

| Yes | No |
|-----|----|
| 7(4.3%) | 38(23.2%) (42.7%) | 119(72.6%) | P* < 0.001 | 58(35.4%) | 106(64.6%) | P = 0.322 |

Physical activity (Sport)

| Yes | No |
|-----|----|
| 11(11.7%) (35.9%) | 21(22.3%) | 62(66%) | P = 0.059 | 41(43.6%) | 53(56.4%) | P = 0.195 |

Fig. 1. Prevalence of physical-behaviour symptoms (a) and psychic symptoms (b) accompanying dysmenorrhea.
that the most common symptoms associated with dysmenorrhea were fatigue, headache, backache and dizziness. Another study conducted in KSA (Abd El-Mawgod et al., 2016), reported that the most common symptoms of dysmenorrhea were fatigue followed by nervousness, backache, myalgia, stomach cramps, abdominal bloating, dizziness, headache, breast tenderness, nausea-vomiting and diarrhea.

Dysmenorrhea is positively correlating with early menarche, irregular cycle, as well as increased duration and amount of menstrual flow (De Sanctis et al., 2019). This is like the finding of this study. In fact, we had found a significant positive correlation between the presence of dysmenorrhea and the age of girls, gynecological age, duration of flow, the presence of clots and the bleeding flow. In the same line a recent study conducted in Italy among secondary schoolgirls, found that gynaecological age was associated with dysmenorrhea, excessive bleeding and cycle irregularity (De Sanctis et al., 2019).

A study conducted by Sundell et al did not find a significant relationship between dysmenorrhea and cycle length (Sundell et al., 1990), which is in according with our result.

Approximately 11% of the participants with dysmenorrhea visited public or private clinic because of their pain, which is lower than that reported amongst Kuwaiti schoolgirls (26%) (Al-Matouq et al., 2019). In fact, most of the participants in this study had mentioned a negative reaction towards their menarche, and they were ashamed to speak about their menstruations in public (Lghoul et al., 2019). This may explain the limited rate of participants who make medical visit.

In our study, the predictor of dysmenorrhea was the gynaecological age. This finding is like the outcome from Mohamed’s study (Mohamed, 2012) and Karout’s (Karout et al., 2012) study both of which also reported an association between earlier menarche and dysmenorrhea. Lee LK’s explain this association stating that as the gynecological age increase, the frequency of the anovulatory cycle decreases, so dysmenorrhea is seen more frequently in older adolescents (Lee et al., 2006). However, other studies reported that prevalence of dysmenorrhea decreases with increasing age (Burnett et al., 2005; Ameade et al., 2018).

In our study the absenteeism school rate was 13%, this rate was approximately similar to the rate found in Italy (12%) (Zannoni et al., 2014). Therefore, our result was lower than those observed in other studies around the world: Abd el mawgod’s study (59.4%) (Abd El-Mawgod et al., 2016), Mohamed’s study (53%) (Mohamed, 2012) and Ortiz’s study (24.1%) (Ortiz et al., 2009). No significant association was found between dysmenorrhea and physical activity in our study. This finding is similar to other studies (Al-Matouq et al., 2019; Blakey et al., 2010). In contradiction; a Japanese study reported a negative association between physical activity and dysmenorrhea (Kazama et al., 2015).

5. Conclusion

Our study revealed that the prevalence of dysmenorrhea is high among schoolgirls (78%) in Marrakesh. A significant association exists between the gynecological age and girls experiencing dysmenorrhea. The rate of absenteeism found in our study was not negligible, that provides evidence to attach more importance to dysmenorrhea considering it as a public health problem especially for adolescent girls. Dysmenorrhea affects not only girls but also their families and social life so its management must be improved by incorporating them in educational programs.

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Declaration of Competing Interest

The authors declare that they have no conflicts of interest.

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