

## ORIGINAL RESEARCH ARTICLE

# Association between Non-Competitive Physical Exercise and Menstrual Disorders

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## Abstract

Menstrual disorders are highly prevalent and generate discomfort, anxiety, and more gynecological visits. There has been an increase in the practice of physical exercise among the general population. This study determined the association between physical exercise and menstrual disorders. An observational analytical study was conducted during 2016 in women of reproductive age from southeast Spain. Information was collected on sociodemographic, gynecological, and nutritional status variables, and the International Physical Activity Questionnaire (IPAQ) was used to gather data on physical exercise. Quantitative/qualitative variables were compared using the non-parametric Mann-Whitney U test and categorical variables with the chi-square ( $\chi^2$ ) or Fisher's exact test, followed by multivariate logistic regression analysis. The study included 122 women; physical exercise was practiced by 50%; menstrual disorders were reported by 53.28 %. The practice of physical exercise, h/week of physical exercise, body type, level of physical exercise, and marital status were associated with the presence of menstrual cycle disorders ( $p < 0.05$ ). This association persisted ( $p = 0.042$ ) after adjustment of the analysis for impaired nutritional status, medication consumption, the presence of disease, age, marital status, age at menarche, and number of children. A high physical activity not related to the practice of sport is associated with menstrual disorders. (*Afr J Reprod Health* 2020; 24[1]: 81-86).

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**Keywords:** Menstrual disorders; physical activity; physical exercise; risk factors

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## Résumé

Les troubles menstruels sont très répandus et génèrent de l'inconfort, de l'anxiété et davantage de visites gynécologiques. Il y a eu une augmentation de la pratique de l'exercice physique dans la population générale. Cette étude a déterminé l'association entre l'exercice physique et les troubles menstruels. Une étude analytique observationnelle a été menée en 2016 auprès des femmes en âge de procréer au sud-est de l'Espagne. Des informations ont été recueillies sur les variables sociodémographiques, gynécologiques et de l'état nutritionnel, et le Questionnaire international sur l'activité physique (QIAP) a été utilisé pour recueillir des données sur l'exercice physique. Les variables quantitatives / qualitatives ont été comparées à l'aide du test non paramétrique de Mann-Whitney U et des variables catégorielles avec le chi carré ( $\chi^2$ ) ou le test exact de Fisher, suivis d'une analyse de régression logistique multivariée. L'étude a compris 122 femmes; l'exercice physique était pratiqué à 50%; des troubles menstruels ont été rapportés par 53,28%. La pratique de l'exercice physique, h / semaine d'exercice physique, le type de corps, le niveau d'exercice physique et l'état civil étaient associés à la présence de troubles du cycle menstruel ( $p < 0,05$ ). Cette association a persisté ( $p = 0,042$ ) après ajustement de l'analyse pour l'état nutritionnel altéré, la consommation de médicaments, la présence de maladie, l'âge, l'état civil, l'âge à l'établissement de la menstruation et le nombre d'enfants. Une activité physique augmentée non liée à la pratique du sport est associée à des troubles menstruels. (*Afr J Reprod Health* 2020; 24[1]:81-86).

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**Mots-clés:** Troubles menstruels; activité physique; exercice physique; facteurs de risque

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## Introduction

The menstrual cycle is a multidimensional phenomenon, including a series of reciprocal influences that are not only biological and psychological but also social and cultural<sup>1</sup>. The failure to identify menstrual disorders can have

negative biological and psychosocial effects on the women and their family members, generating anxiety, unnecessary tests, and inappropriate medicalization<sup>2</sup>. The reported prevalence of these disorders ranges between 76.4 and 26 %<sup>3-5</sup>, and they were found to be responsible for 70 % of gynecological visits in one study<sup>3</sup>.

There has been a general increase in the practice of physical exercise, which is promoted as a preventive factor against cardiovascular disease<sup>6</sup>, cancer<sup>7</sup>, and obesity<sup>8</sup>, among other health problems. It is possible to differentiate among: *physical activity* (skeletal muscle-generated movement resulting in additional energy expenditure to that of basal metabolism), *physical exercise* (conducted in a structured/organized manner to improve basic physical capacities), and *sports activity* (practice of competitive sport that includes training and adherence to rules)<sup>9</sup>.

Menstrual disorders have been associated with insomnia<sup>10</sup>, early menarche, parity<sup>11</sup>, marital status<sup>12</sup>, excess physical activity<sup>13</sup>, and nutritional status<sup>14</sup>, among other factors. Evidence on the frequency of menstruation disorders and their impact on the health, quality of life, and social integration of women suggest that the evaluation and treatment of menstrual discomfort should receive greater priority in primary care programs<sup>15</sup>.

There has been a rise in the number of women reporting some type of menstrual disorder, who are increasingly prescribed with hormonal therapy; however, this is frequently inappropriate, resulting in a larger number of women receiving unnecessary exogenous hormone treatments. There have been studies on the impact of sports on the menstrual cycle of high-performance sportswomen but much less research has focused on the effects of physical exercise on women in the general population. The objective of this study was to determine the association between physical exercise non-competitive and menstrual disorders.

## Methods

### Design

This was an observational descriptive study

### Setting and sample

Province of Jaen (Southeast Spain) during 2016. The reference population comprised women of reproductive age according to the criterion of the World Health Organization (WHO), i.e., aged between 15 and 44 yrs. Study inclusion criteria were: age between 18 and 44 years (inclusive) and menarche at least one year earlier. Exclusion criteria were: receipt of hormonal (contraceptives, etc.) or other medication that could alter study variables (e.g.,

liquid retention, etc.); consumption of dietary supplements; and practice of sports at a competitive level.

A sample size of 50 women was estimated for each study cohort (physical exercise and non-physical exercise), based on a reported incidence of menstrual disorders of 72 % in non-sportswomen<sup>16</sup>, for a power of 80.0 % to detect differences in the contrast of the null hypothesis ( $H_0: \mu_1 = \mu_2$ ), using a bilateral chi-square test for two related samples and considering a level of significance of 5.0 %. To cover possible dropouts, 126 women were recruited for the study. The final sample size was 122 women after three withheld consent and another withdrew from the data gathering process. Participants were consecutively selected from centers where physical exercise is practiced or where women meet in neighborhood or women's associations.

### Data collection

Data were always gathered in the early part of the morning by a single observer using a questionnaire that contained all study variables and following a standardized protocol. Information was obtained on: sociodemographic and health variables; type, frequency, and duration of physical exercise and the time for which it had been practiced; and menstruation variables (date of menarche; menstrual ataxias; duration, amount, and frequency of menstruation; and the presence or history of premenstrual syndrome). Data were obtained on nutritional status using a TANITA S330<sup>R</sup> portable bioimpedance analyzer, following the manufacturer's instructions, and skinfolds were measured with a Holtain-type caliper and non-extendable measuring tape. Instruments were calibrated before each measurement. The level of physical activity was determined by applying the validated International Physical Activity Questionnaire (IPAQ)<sup>17,18</sup>. Menstrual cycle disorder was defined by a duration of > 7 or <3 days, a frequency of < 21 or >35 days, or the need for sanitary towel change after < 2 or >6 h<sup>19</sup>. Impaired nutritional status was defined by BMI <18.5 or >25, tricipital skinfold percentile < 5 or >90, and body fat percentage >30 %<sup>20</sup>.

Physical activity was classified as high, moderate, or low, and as predominantly aerobic (medium- or low-intensity of long duration, e.g., walking, swimming, etc.) or anaerobic (high-intensity of short duration, e.g., running, high-intensity training, etc.)<sup>17</sup>.

### Statistical analysis

A descriptive analysis was first performed, expressing continuous variables as means  $\pm$  standard deviation (SD) and categorical variables as frequencies and percentages. The non-parametric Mann-Whitney U test was used to compare quantitative/qualitative variables and the chi-square test or Fisher's exact test to compare categorical variables. A multivariate logistic regression model was constructed with menstrual disorder as dependent variable, entering variables that showed statistical significance in bivariate analyses, those considered of clinical or diagnostic relevance, and possible confounding factors. STATA version 12 was used for the data analyses.  $P < 0.05$  was considered significant.

### Results

The study included 122 women with a mean age of  $26.23 \pm 8.40$  years (range, 18-43 years): the 50% (61) of them routinely practiced some physical exercise for  $6.31 \pm 6.94$  h/week (1.5 -40) and for a mean of  $8.5 \pm 6.47$  years (1-28), whereas the 40.98% (50) reported only moderate physical activity. Out of the total sample, the 75.21% (91) had no children, 13 (10.74%) had one child, the 21.49% (21) had two children, and the 3.31% (4) had more than two. Regarding educational level, the 6.56% (8) had primary schooling, the 27.05% (33), had completed secondary schooling, and the 66.39% (81) were university students or graduates. The 48.59% (59) were students, the 44.26% (54) were employed, the 6.56% (8) were unemployed, and 0.82% (1) was a homemaker. Menstrual cycle disorders were reported by the 53.28% (65) of participants and premenstrual syndrome by the 68.03% (83).

As shown in Table 1, the practice of physical exercise was positively associated with the presence of menstruation disorders ( $p=0.046$ ), and this association persisted after controlling for impaired nutritional status, medication consumption, the presence of disease, age, marital status, age at menarche, and number of children ( $p=0.042$ ). The women who did not have menstrual disorders were married 24.56% (14) while in the group of women who had menstrual disorders the married ones were 10.94% (7) ( $p=0.010$ ). As can be seen in Table 1, an association was also established between menstrual disorders and type of body, physical activity level and intensity of physical exercise (h/week) ( $p < 0.05$ ).

### Discussion

A high prevalence of menstrual disorders was found among these women. The marital status, type of body, physical activity level and intensity of physical exercise has been associated with menstrual disorders.

Although a similar prevalence to that of our study has been reported by other studies in different countries, they generally focused on women engaged in competitive sports activities<sup>3-5,16</sup>. Various authors have observed a higher frequency of menstrual disorders among sportswomen than among women in general<sup>21,22</sup>, with one study reporting a prevalence of 93.4% in sportswomen *versus* 72% in non-sportswomen ( $p < 0.001$ )<sup>16</sup>. The prevalence of premenstrual syndrome was similar to a previous report in our setting<sup>23</sup>.

The practice of physical exercise was identified as a risk factor for menstrual disorders. As already mentioned, various authors also reported an association between physical exercise and menstrual disorders, but among professional sportswomen<sup>13,16,21</sup>. In this context, a significant association was found between the intensity (h/week) of physical exercise and menstrual disorders in the present study.

Marital status was associated with menstrual disorders, which were more likely in the women who were married, as previously observed in a study of nursing students<sup>12</sup>. No association was found between parity and menstrual disorders, in agreement with some researchers<sup>23</sup> but not with others<sup>21,11</sup>, or between educational level and menstrual disorders, as also reported by some authors<sup>23,24</sup> but not by others<sup>21</sup>.

Nutritional status was not a predisposing factor for menstrual disorders in our study, as proposed by some researchers<sup>14,21</sup>, and the influence of the premenstrual syndrome reported by some authors<sup>21</sup> was not detected.

One of the main study limitations is the relatively small sample size, although it exceeded the size estimated necessary to obtain valid and reliable results. Inadequate scientific data appear available to establish whether the prevalence of physical exercise in our study sample was representative of the prevalence among women in the general population. Among study strengths, numerous potential confounders were controlled for in the exclusion criteria and in the multivariate analysis, and classification bias was minimized by using a single examiner and calibrated instruments that are

**Table 1:** Association between the sociodemographic and lifestyle characteristics of women and the incidence of menstrual disorders

Variable	Menstruation disorder		p*
	yes	no	
<b>Age (years), mean±sd</b>	25.70±8.36	26.82±8.47	0.291
<b>Age at menarche (years), mean±sd</b>	12.42±1.42	12.59±1.30	0.598
<b>Marital status % (n)</b>			0.010
Single	76.56 (49)	75.44 (43)	
Married	10.94(7)	24.56 (14)	
Common-law partner	4.69(3)	0.0 (0)	
Divorced	7.81(5)	0.0 (0)	
<b>Number of children, % (n)</b>			0.380
None	76.92 (50)	71.93 (41)	
1 child	13.85 (9)	8.77 (5)	
2 children	7.69 (5)	14.04 (8)	
> 2 children	1.54 (1)	5.26 (3)	
<b>Educational level, % (n)</b>			0.474
Primary schooling	9.23 (6)	3.51 (2)	
Secondary schooling	26.15 (17)	28.07 (16)	
University studies	64.62 (42)	68.42 (39)	
<b>Professional activity, % (n)</b>			0.297
Student	50.77 (33)	45.61 (26)	
Homemaker	1.54 (1)	0.0(0)	
In paid employment	44.62 (29)	43.86 (25)	
Unemployed	3.08(2)	10.53(6)	
<b>Type of body, % (n)</b>			0.045
Athletic	58.46 (38)	40.35 (23)	
Normal	41.56 (27)	59.65 (24)	
<b>Presence of disease, % (n)</b>			0.283
Yes	78.46 (51)	84.21(48)	
No	21.54(23)	15.79(9)	
<b>Medication consumption, % (n)</b>			0.522
Yes	13.85 (9)	12.50 (7)	
No	86.15 (56)	87.50 (49)	
<b>Presence/history of premenstrual syndrome, % (n)</b>			0.844
Yes	67.21 (41)	68.85 (42)	
No	32.79 (20)	31.15 (19)	
<b>Nutritional status disorder, % (n)</b>			0.528
Yes	55.38 (36)	54.39 (31)	
No	44.62 (29)	45.61 (26)	
<b>Physical activity level, % (n)</b>			0.020
High	41.54 (27)	21.05 (12)	
Moderate	40.00 (26)	42.11 (24)	
Low or Inactive	18.46 (12)	36.84 (21)	
<b>Practice of physical exercise, % (n)</b>			0.042
Yes	58.46 (38)	40.35 (23)	
No	41.54 (27)	59.65 (34)	
<b>Type of physical exercise, % (n)</b>			0.271
Predominantly anaerobic	72.22 (13)	27.78 (5)	
Predominantly aerobic	57.14 (24)	42.86 (18)	
<b>Intensity of physical exercise (h/week), mean±sd</b>	6.84±6.21	5.47±8.06	0.024
<b>Time for which physical exercise has been practiced (years), mean±sd</b>	9.07±6.47	7.73±6.53	0.405

\* Adjusted for impaired nutritional status, medication consumption, the presence of disease, age, marital status, age at menarche, and number of children.

**Abbreviations: sd: standard deviation**

validated<sup>17</sup> or have a low margin of error. Finally, selection bias would be minimal, given that only three participants were lost to the study.

#### *Implications for women*

It should be included in the health education programs aimed at women contained about

the importance of physical activity and its relation to menstrual disorders. Healthcare practitioner should also be trained on the relationship of physical activity and menstrual disorders. In addition, if women who have a high physical activity (women who walk long journeys and / or for a long time or who have jobs that require a high level of physical activity to carry it out) should know that their menstrual cycle can present disorders. In this way, they identify the possible cause of their menstrual disorder and can help reduce the anxiety and worry that this disorder may cause them. If they have that information, they would have less stress and anxiety if they have a menstrual disorder, which would improve their health at a psychological level.

### Ethical Approval

All participants signed their informed consent to participation in the study, which was approved by the Research Ethics Committee of the University of Jaen.

### Conclusion

In conclusion, physical activity appears to increase the risk of menstrual cycle disorders in women who do not engage in competitive sports activities. A greater understanding of the etiology of menstrual disorders might help women to improve their self-healthcare and minimize medicalization.

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### Author Contributions

Conceptualization, J.M.M.-G. and A.R.P.-M.; Methodology, J.M.M.-G.; Software, J.M.M.-G and A.R.P.-M.; Validation, J.M.M.-G. and A.R.P.-M.; Formal Analysis, J.M.M.-G; Investigation, J.M.M.-G and A.R.P.-M.; Resources, J.M.M.-G, A.R.P.-M, M.D.P-M and M.D.M-I; Data Curation, J.M.M.-G; Writing – Original Draft Preparation, J.M.M.-G and A.R.P.-M.; Writing – Review & Editing, J.M.M.-G, A.R.P.-M, M.D.P-M and M.D.M-I; Visualization, J.M.M.-G.; Supervision, J.M.M.-G.; Project Administration, J.M.M.-G.

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### Conflicts of Interest

The authors declare no conflict of interest.

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