

QUALIDADE DO SONO EM MULHERES ADULTAS COM DIFERENTES NÍVEIS DE ATIVIDADE FÍSICA: UM ESTUDO PILOTO

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Resumo: O objetivo do presente estudo foi analisar a influência do nível de atividade física na qualidade do sono de mulheres adultas brasileiras. O nível de atividade física foi avaliado segundo o Questionário de Atividade Física Habitual de Baecke. Para mensuração da qualidade do sono, foi utilizado o Índice de qualidade de sono de Pittsburgh. As participantes foram divididas nos grupos Maior nível de atividade física e Menor nível de atividade física, de acordo com pontuação no Questionário de Atividade Física Habitual de Baecke, correspondente ao primeiro e terceiro tercil da amostra. Dessa forma, das 29 participantes, foram incluídas 20 adultas na análise por grupo. Em seguida, a qualidade do sono foi comparada entre os grupos a partir da classificação da qualidade do sono, componentes e escore obtido pelo Índice de qualidade de sono de Pittsburgh. Os grupos foram comparados a partir do teste t de Student ou U-Mann Whitney, de acordo com a distribuição dos dados. O teste qui-quadrado foi utilizado para comparar variáveis categóricas. Para todas as análises, foi adotado $p < 0.05$. Para o desfecho sono, ambos os grupos foram predominantemente classificados com “Qualidade ruim”, independentemente do nível de atividade física. Por outro lado, na análise dos escores no Índice de qualidade de sono de Pittsburgh, os grupos apresentaram uma tendência a diferença ($p = 0.05$), em que o grupo Maior nível de atividade física apresentou escores melhores (7.90 ± 3.03) quando comparado ao grupo Menor nível de atividade física (10.30 ± 2.00). Baseado nesses resultados, apesar de não ter sido demonstrada diferença significativa na classificação do sono e seus componentes, foi observada tendência a diferença no escore total no Índice de qualidade de sono de Pittsburgh, indicando que níveis maiores de atividade física parecem contribuir com a qualidade do sono de mulheres adultas. Devido a amostra reduzida, são recomendadas futuras investigações.

Palavras-chave: sono; atividade física; mulher; qualidade de vida

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SLEEP QUALITY IN ADULT WOMEN WITH DIFFERENT LEVELS OF PHYSICAL ACTIVITY: A PILOT STUDY

Abstract: The present study aimed to analyze the influence of the level of physical activity on sleep quality in Brazilian women. The level of physical activity was assessed by the Baecke questionnaire on habitual physical activity. To measure sleep quality, the Pittsburgh sleep quality index was used. Participants were divided into groups of Higher and Lower levels of physical activity, according to the score obtained in the Baecke questionnaire on habitual physical activity, corresponding to the first and third tertile of the sample. After the stratification, 20 out of 29 female adults were included in the group analysis. Sleep quality components were compared between groups by classification, components, and scores obtained in the Pittsburgh sleep quality index. . According to the data distribution, groups were compared using Student's t-test and U-Mann Whitney. The chi-square test was used to compare the categorical variables. For all analyzes, $p < 0.05$ was used. For the outcome sleep, both groups were predominantly classified with "Poor quality", independently of physical activity levels. On the other hand, in the analysis of the scores in the Pittsburgh sleep quality index, the groups presented a tendency to difference ($p = 0.05$), in which the Higher level of physical activity group presented better scores (7.90 ± 3.03) compared to the Lower level of physical activity group (10.30 ± 2.00). Based on the results, although there was no significant difference in sleep classification and components between the groups, a tendency to difference was observed in the total score of the Pittsburgh sleep quality index, indicating that higher levels of physical activity seem to contribute to the sleep quality in adult women. Due to the reduced sample, is recommended further investigation.

Key words: sleep; physical activity; women; quality of life

Introduction

In the last decades, the agitated lifestyle, social and economic pressures, as well regular exposure to artificial light have affected the quality of sleep in the general population¹. Sleep is considered essential for many vital neurophysiological processes, being recommended, on average, seven daily sleep hours for health maintenance². Due to events followed according to different stages of life, such as puberty, pregnancy, and menopause, women's sleep quality can be affected³. Other sleep disorders are often related according to each phase experienced³ also, habits related to lifestyle, such as poor sleep hygiene, routine with many commitments and stimulating substances, can contribute to sleep disorders⁴.

The effects of sleep disorders could be diverse, some of which are: decreased daily functioning, increased likelihood of developing psychiatric disorders, impaired cognitive performance, increased or the forthcoming of health problems, among other problems⁵. Moreover, the difficulty of initiating sleep, added to multiple nighttime awakenings with the delay to resume sleep, or even early awakening, is characterized as insomnia⁶. This condition also reflects on the individual's quality of life, causing drowsiness and/or fatigue during wakefulness⁴.

In this sense, among non-pharmacological therapies, physical exercise has been recommended to manage sleep disorders⁷. There is evidence of the beneficial effects of physical exercise on sleep quality. Participation in an exercise program promotes more relaxed sleep, restorative, and less necessity for sleep⁸.

In a systematic review and meta-analysis study, physical exercise was shown to be effective in improving the quality of sleep in adult women⁹. On the other hand, this favorable response was observed depending on the type of exercise and intensity adopted. In the same way, when compared to men, women tend to be less physically active, which may indicate interference in quality of life in terms of physical activity¹⁰.

Therefore, it is need to investigate the influence of physical activity on women's sleep since this population seems to be more affected in their sleep when compared to men. Thus, the present study aimed to analyze the sleep quality in adult women, according to the level of physical activity.

Materials and Methods

Participants

The present study consist in cross-sectional, approved by the Ethics and Research

Committee on Human Beings of the Federal University of Technology – Parana (UTFPR, campus Curitiba), under the number CAAE 03628618.1.0000.5547, following the criteria established by Resolution 466/12 of the National Health Council. All participants signed an Informed Consent Form.

A survey was disseminated through folders information, social media, and posters on the UTFPR, campus Curitiba to recruit the participants. The sample was defined for convenience and comprised by adult women who met the following inclusion criteria: age between 25 to 50 years; availability for participation in the study, with no stimulating medications and supplements use. The sample excluded women who failed to answer any of the proposed questionnaires. In total, 29 adult women met the inclusion criteria and responded questionnaires in full-version. After that, the groups are divided according to the scores obtained in Baecke's usual physical activity questionnaire (Figure 1). Of these, 20 adult women were included in all analyses.

Procedures

All the questionnaires mentioned below were applied in a single visit, personally and individually, in a place without extreme noise and movement of people. The duration of the questionnaire's application was, on average, 1 hour, as there was an explanation of the research objectives and the importance of the participant's contribution to the study.

Socio-demographic data

The participants answer a structured anamnesis about sociodemographic data, such as age, education, marital status, number of children, medications in use, physical activity, and comorbidities.

Sleep quality

To assess sleep quality, all participants responded to the Pittsburgh Sleep Quality Index. This instrument is used to evaluate the quality of the participant's sleep for the past 30 days and allows sleep to be classified into two categories: 0-4 points indicate good sleep quality; 5-10 indicate poor quality, and 10 or more indicate sleep disorder ¹¹. This instrument has 19 self-report questions, which are grouped into 7 components: 1) Subjective sleep quality; 2) Sleep latency; 3) Duration of sleep; 4) Usual sleep efficiency; 5) Sleep disorders; 6) Use of sleep medications, and 7) Daytime dysfunction. The seven components' scores are added to give an

overall score, which can vary from 0 to 21, indicating three possible sleep classifications, as mentioned above.

Physical activity level

The level of physical activity of the participants was measured using the *Baecke's habitual physical activity questionnaire*¹². This questionnaire considers the last 12 months before its application, and three dimensions of physical activity are included: occupational, leisure, and commuting. This questionnaire is organized in a Likert scale format. The result presented by this tool is quantitative dimensionless¹³.

“Higher level of physical activity” and “Lower level of physical activity” groups

Physical activity was classified into two groups: the highest level and the lowest level. The participants were divided into tertiles according to the score found in Baecke's usual physical activity questionnaire (Figure 1). Thus, the first tertile was considered the group with the lowest physical activity level ($n = 10$) and the third tertile as the Group with the highest physical activity level ($n = 10$).



Figure 1 - Participants included in the analysis divided into “Lower level of physical activity” and “Higher level of physical activity” groups, according to the score obtained in Baecke's usual physical activity questionnaire.

Statistical analysis

Initially, data distribution was verified using the Shapiro-Wilk test. For descriptive analysis, mean and standard deviation were used for data for normal distribution, and median and interquartile range for non-normal distribution. Then, in the case of normal distribution, the groups were compared using the Student's t-test for independent samples, and the Levene test

was used to verify homogeneity. For non-normal distribution, the U-Mann Whitney test was used to compare the groups. For categorical variables, the chi-square test (χ^2) was used. The data were analyzed using the SPSS 18.0 software¹⁴. Given the sample by convenience, the number of participants and the scores obtained in Pittsburgh Sleep Quality Index, the sample power was calculated using post-hoc power analysis in G*Power¹⁵. For all analyzes, $p < 0.05$ was adopted.

Results

To compare the quality of sleep, according to the level of physical activity, the sample was divided into two groups based on the score obtained in Baecke's usual physical activity questionnaire. The division was carried out in tertile, the first tertile being equivalent to 7.10 points, considered in the present study as the Lower level of physical activity group, which included 10 participants in this group. The third tertile was equivalent to 8.72 points, considered the Higher level of physical activity group.

The participants were characterized by sociodemographic data, scores of physical activity obtained by Baecke's questionnaire, and sleep quality by Pittsburgh index. Table 1 shows the sample's main characteristics, presented in central tendency (mean or median) and dispersion values (standard deviation or interquartile range - IIQ) according to the distribution of data and groups. For categorical variables, frequency is arranged in absolute and relative numbers (percentage - %). Regarding the data distribution, the Shapiro-Wilk normality test showed a normal distribution for the scores obtained in Baecke's habitual physical activity questionnaire. However, age (years) and the Pittsburgh Sleep Quality Index score did not present a normal distribution.

Other factors that could interfere with the quality of sleep in relation to the participant's general characteristics were evaluated - marital status, medications for continuous use, children. Similar characteristics were found between the groups (age, marital status, children, medication for continuous use), as shown in Table 1.

Table 1 - General characteristics of the participants between the “Lower level of physical activity” and “Higher level of physical activity” groups, expressed in central tendency (mean or median), dispersion values (standard deviation or interquartile range), and values absolute and relative (%).

Variables	Lower level of physical activity group (n= 10)	Higher level of physical activity group (n = 10)	p value
Age (years)	34.5 (IIQ= 18)	32.5 (IIQ= 19.25)	0.68
<i>Baecke's habitual physical activity questionnaire</i> (score)	6.13 ± 0.75	9.52 ± 1.08	0.00**
Pittsburgh Sleep quality index (score)	10.30 ± 2.00	7.90 ± 3.03	0.05
Marital status (n)	7 married / 3 single	6 married / 4 single	0.63
Children (n)	6 has children/ 4 no children	5 has children/ 5 no children	0.65
Medicine in use (n/%)	6 used / 4 non-users	4 used/ 6 non-users	0.37

**p<0,01

As expected, for the scores obtained in Baecke's usual physical activity questionnaire, there was a significant difference. The group “Higher level of physical activity” had a higher score when compared to the group “Lower level of physical activity.” When comparing the groups according to the Pittsburgh sleep quality index, the Student t test for independent samples showed a tendency towards a difference in sleep quality ($p = 0.05$). The group, “Higher level of physical activity,” obtained a lower score on the questionnaire when compared to the group “Lower level of physical activity.”

On the other hand, the Chi-square test did not significantly differ between the groups, taking into account the sleep classification. In contrast, of the total sample, only 1 participant from the group “Higher level of physical activity”, had sleep classification as “Good quality of sleep” (Figure 2). Figure 3 present the seven component's of the Pittsburgh Sleep Quality Index's assessed individually. When comparing the groups for such components, no significant differences were found.

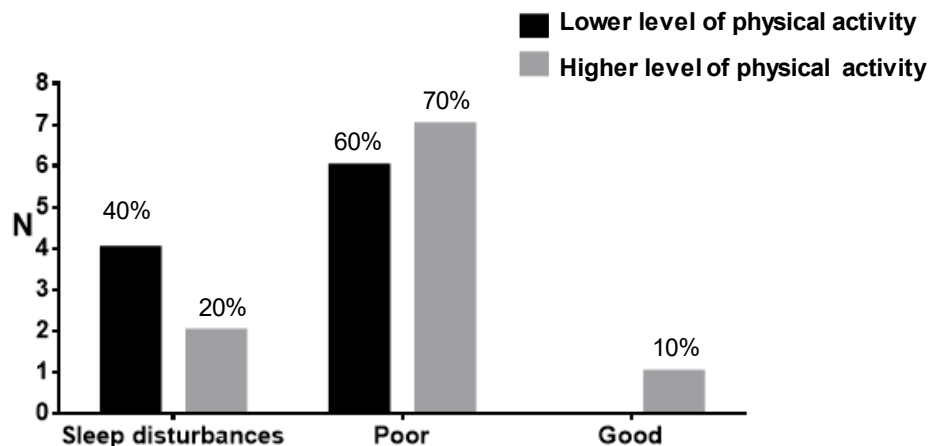


Figure 2 - Classification of sleep quality between the groups "Higher level of physical activity" and "Lower level of physical activity."

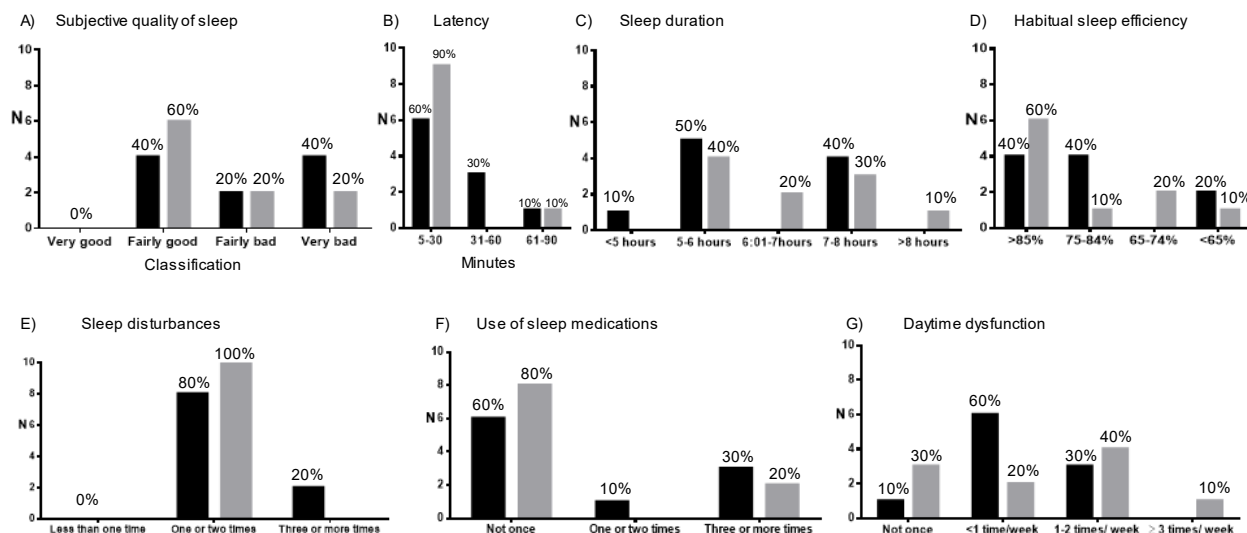


Figure 3 - A) Subjective sleep quality; B) Sleep latency (in hours); C) Duration of sleep (in hours); D) Usual sleep efficiency; E) Sleep disorders; F) Use of sleep medications; G) Daytime dysfunction between the groups "Higher level of physical activity" and "Lower level of physical activity".

The sample power ($1-\beta$) was calculated considering the scores obtained in Pittsburgh Sleep Quality Index for each group. The result could be considered as low power, once corresponded to 0.50, below 0.80, which is desired for biomedical studies.

Discussion

The present study aimed to analyze the influence of the level of physical activity on the

quality of sleep of adult women. Among the main results, there was a tendency for a difference between the groups with the lowest and highest physical activity levels in the Pittsburgh Sleep Quality Index overall score.

It was observed that most of the sample, regardless of the level of physical activity, had their sleep classified as “Poor sleep quality”. In this sense, although the regular practice of physical activity contributes to the population’s sleep in general ¹⁶, the quality of sleep as a possible indicator of several factors associated with lifestyles, such as sleep hygiene and an excess of scheduled activities is necessary to consider. In a review study by Pengo et al. ³, the authors describe that concerning women, each phase corresponding from childhood to menopause may be accompanied by several sleep disorders, mainly pregnancy and hormone changes due to menarche and menopause. The poor quality may reveals how many the sleep of female women had been negatively affected. This finding represent a kind of alert in relation to the health, emphasizing the importance in changing the lyfestyle to reach quality of life of women adults.

Only one participant was classified with “Good sleep quality”. In Baecke's usual physical activity questionnaire, the participant had a score equal to 11.4 points, classified as the highest level of activity, with the average of the sample being 7.78 points.

The intensity of exercise ⁹ and the schedule of practice ¹⁷ could influence the quality of sleep. Related to intensity, Hobson ¹⁸ proposes the existence of an optimal intensity for physical exercise in terms of sleep quality. Therefore, intensities below or far above the ideal would not affect or would be harmful respectively ¹⁹. This may explain in parts that, regardless of the different classifications obtained in Baecke's usual physical activity questionnaire, the Pittsburgh Sleep Quality Index can be "Poor quality of sleep", since the first questionnaire does not include questions about the time of physical exercise, as well as the intensity adopted. On the other hand, despite not specifying the intensity in physical exercise, Baecke's usual physical activity questionnaire provides a calculation considering three levels of physical activity: light, moderate and intense, listed by the participant as 1, 2, or 3, respectively. Such levels are equivalent to the METs provided in the Compendium of Physical Activities ²⁰, requiring verification of the relationship between the activity’s response and the level indicated since correction can be made based on the compendium, if necessary. However, even if the questionnaire requires this registration, this measure is still deficient in precise parameters of intensity adopted in training protocols, therefore being a limitation of the questionnaire itself.

Even more, regarding Baecke's usual physical activity questionnaire and his sensitivity

to the study, there is a need to categorize the final score obtained by it, with a cut-off line. In addition, it is necessary to use measures based on more objective instruments, such as a pedometer and accelerometer, which can constitute direct measures of the level of more precise physical activity ²¹.

Likewise, although the Pittsburgh Sleep Quality Index is a widely used instrument in clinical practice, the gold standard tests for screening quality and sleep disorders are mainly polysomnography and multiple sleep latency tests. Although there are other questionnaires related to sleep quality, these are exclusive for clinical use because they have a final diagnosis ²².

Other studies that used the Pittsburgh Sleep Quality Index found lower scores compared to the present study. A recent cross-sectional study conducted in the same country, including adults both sexes, indicated a central tendency value – median - of the questionnaire corresponded to 7.00 points and 4.00 scores of dispersion - interval interquartile range ²³, lower scores when compared to our findings. Even with lower score, the most part of the 2,635 adults were classified as with poor sleep, corroborating, in parts, with the present data. Of these, younger, female, having a partner sleeping in another bed or room, self-reported insomnia, and smart phone/interactive media use were predictors of poor sleep quality ²³. Likewise, when the authors analyzed the data by regions of Brazil, the South was one in which the female adults are more affected in their quality of sleep. Therefore, even with discrepant scores, the classification of quality of sleep obtained in both studies, as well the tendency to have a poor sleep of woman living in the South of Brazil, present some similarity.

Regarding socio-demographic characteristics, 29 women between 25 and 50 years old who practice or not regular and systematized physical activity took part in the study. The average age was 34.5 years, predominantly married and working. According to a survey carried out by the Brazilian Institute of Geography and Statistics (IBGE) in 2018 ²⁴ on the social indicators of women in Brazil, it was possible to observe that 54.4% of women aged 14 and over are working in the labor market concomitantly with chores household or personal care. In this same IBGE document, it was possible to observe other indications between the decades about women's occupational situation. Regarding women between 30 and 49 years old, it was possible to observe that in 2000 more than 14 million women in this age group were classified as economically active. In 2010, that number rose to approximately 19 million. Another fact that induces women's permanence in the labor market is the activity rate, translated as a percentage, of women between 30 and 49 years of age economically active: in 2000 - 76.1%

and 2010 - 78.2%. This high level of occupation can be a negative factor for the quality of sleep since this population tends to accumulate formal work with daily tasks ²⁴.

For the Physical Education field, the present study report that although the no difference among the classifications in sleep quality, the level of physical activity seems contribute to the score in Pittsburgh sleep quality index, tending to low scores in this questionnaire, in which higher scores corresponding to worse sleep quality. Thus, the regular practice of physical activity could be one a positive contributor to sleep quality. To measure the chronic physical exercise effects, future studies, clinical trials, with longitudinal design should be used to clarify the role of exercise in the sleep of female adults population.

Although the influence of physical activity levels in the sleep of female adults has been shown, there are limitations that should be recognized, such as the reduced sample, also the convenience to recruit participants and the instruments to measure the sleep quality and physical activity levels. Further studies using other techniques as polysomnography, pedometer or accelerometer to sleep quality, physical activity measurement and amplified sample may assist the understanding of the influence of physical activity levels on sleep quality.

Conclusion

The results found in this study showed no significant difference, according to the level of physical activity, in the classification of sleep quality in adult women, and there was a tendency for a difference concerning the absolute values (points) in the Pittsburgh Sleep Quality Index. Thus, considering this second finding, the level of physical activity contributes to the quality of sleep in adult women. In addition, despite the comparison between different levels of physical activity, it is important to note that sleep quality classification was similar between groups. This can reveal how much women's sleep has been negatively affected. This finding represents an alert regarding health, emphasizing how important lifestyle changes are made to achieve a quality of life in women. To measure the long-term effects of physical exercise, experimental studies with longitudinal design can be used to clarify physical exercise's role in the quality of sleep in this population.

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