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Self-reported characterization of sleep quality in trained male and female amateur triathletes: a descriptive study

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Self-reported characterization of sleep quality in trained male and female amateur triathletes: a descriptive study

Caracterización auto informada de la calidad del sueño en triatletas amateurs masculinos y femeninos entrenados: un estudio descriptivo

Caracterização da qualidade do sono em triatletas amadores treinados do sexo masculino e feminino: um estudo descritivo

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Abstract: Sleep quality is a determining factor for performance and health of sportspeople in general. The objective of the present study was to characterize sleep quality in trained male and female amateur triathletes aged between 20 and 59 years. A survey was carried out with 151 trained amateur triathletes, 108 men (38.6 ± 8.1 years; 5.8 ± 4.3 years' experience in triathlon training; training frequency 6.3 ± 0.9 days per week) and 43 women (39.3 ± 7.6 years; 4.8 ± 3.3 years' experience in triathlon training; training frequency 6.5 ± 0.6 days per week). Sleep quality was measured through the Pittsburgh-Br Sleep Quality Index (PSQI-Br). Total values under 05 points indicate sleep quality is good, and values equal to or above 05 points indicate poor sleep quality. Sub-scale data were analyzed by using absolute and relative frequencies. The remaining data for characterizing sleep quality were analyzed with median, mean, standard deviation, standard error and a confidence interval of 95% of the mean. Both male and female triathletes have poor sleep quality (values equal to or above 05 points), which can have negative effects on health and performance. In conclusion, all athletes, regardless of gender and age group, have poor sleep quality.

Keywords: sleep, triathletes, performance, athlete training

Resumen: La calidad del sueño es un factor determinante para el rendimiento y la salud de los deportistas en general. El objetivo del presente estudio fue caracterizar la calidad del sueño en triatletas aficionados masculinos y femeninos entrenados entre 20 y 59 años. Se realizó una encuesta con 151 triatletas aficionados entrenados, 108 hombres (38.6 ± 8.1 años, experiencia en entrenamiento de triatlón 5.8 ± 4.3 años, frecuencia de entrenamiento 6.3 ± 0.9 días por

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semana) y 43 mujeres (39.3 ± 7.6 años, experiencia en entrenamiento de triatlón 4.8 ± 3.3 años, frecuencia de entrenamiento 6.5 ± 0.6 días por semana). La calidad del sueño se midió mediante el índice de calidad del sueño de Pittsburgh-Br (PSQI-Br), los valores totales por debajo de 05 puntos indican que duermen bien y los valores iguales o superiores a 05 puntos indican que duermen mal. Los datos de las subescalas se analizaron utilizando frecuencias absolutas y relativas. Los demás datos para la caracterización de la calidad del sueño se analizaron con mediana, media, desviación típica, error estándar e intervalo de confianza del 95% de la media. Los triatletas masculinos y femeninos tienen una mala calidad del sueño (valores iguales o superiores a 05 puntos), lo que puede tener efectos negativos en la salud y el rendimiento. En conclusión, todos los triatletas, sin importar el género y el grupo de edad, tienen una mala calidad del sueño.

Palabras clave: sueño, triatletas, desempeño, entrenamiento de los atletas

Resumo: A qualidade do sono é um fator determinante para o desempenho e a saúde dos atletas em geral. O objetivo do presente estudo foi caracterizar a qualidade do sono em triatletas amadores treinados, masculinos e femininos, com idades entre 20 e 59 anos. Foi realizada uma pesquisa com 151 triatletas amadores treinados, 108 homens (38,6 ± 8,1 anos, experiência de treinamento de triatlo 5,8 ± 4,3 anos, frequência de treinamento 6,3 ± 0,9 dias por semana) e 43 mulheres (39,3 ± 7,6 anos, experiência de treinamento de triatlo 4,8 ± 3,3 anos, frequência de treinamento 6,5 ± 0,6 dias por semana). A qualidade do sono foi medida usando o Índice de Qualidade do Sono de Pittsburgh-Br (PSQI-Br), com valores totais abaixo de 05 pontos indicando sono bom e valores iguais ou acima de 05 pontos indicando sono ruim. Os dados das subescalas foram analisados usando frequências absolutas e relativas. Os outros dados para a caracterização da qualidade do sono foram analisados com mediana, média, desvio padrão, erro padrão e intervalo de confiança de 95% da média. Triatletas masculinos e femininos têm a qualidade de sono ruim (valores iguais ou superiores a 05 pontos), o que pode ter efeitos negativos sobre a saúde e o desempenho. Em conclusão, todos os triatletas, independentemente do gênero e da faixa etária, têm uma qualidade de sono ruim.

Palavras-chave: sono, triatletas, desempenho, treinamento de atletas

1. Introduction

Triathlon is a sport composed of the stages of swim, cycle, and run, performed in this order and without interruptions (Millet & Vleck, 2000), and is divided by age categories for amateurs. Official Triathlon distances contested in races vary, with the shortest distance being the super sprint (250-300m swim, 05-08 Km cycle, and 1.5-02 Km run) (Quagliarotti et al., 2022), and the Ultraman® Triathlon is a most long-distance race, held over three days (10 Km swim, 420.2 Km cycle e 84.4 Km run) (Smith et al., 2020). In this sense, training involves high volumes to prepare for target distances (Etxebarria et al., 2019) and needs efficient recovery between them.

In general, sleep has a crucial role in the recovery process of athletes (Fullagar et al., 2023). Specifically, in triathlon, the literature presents only two profiles of studies relating sleep to this sport. The first profile comprises studies investigating general aspects of athletes' sleep, including several modalities (Costa & Re, 2023; Johnston et al., 2020; Vitale et al., 2019; Wilson, 2020).

On the other hand, the second profile is composed of specific triathlon studies (Stevens et al., 2018; Sinisgalli et al., 2021; Kisiolek et al., 2022), who seek to understand more directly the relationship between aspects of sleep and Triathlon. The study by Stevens et al. (2018) pointed out that a trip to perform a competition impaired the sleep of male master triathletes. Sinisgalli et al. (2021) indicate insufficient sleep duration in male and female amateur triathletes. Finally, in the study by Kisiolek et al. (2022), a negative correlation was found between performance and sleep duration. In this sense, although the literature has presented important findings regarding the sleep of triathletes, no study proposed to characterize sleep quality in a generalized way in amateur triathletes.

Characterizing the sleep quality of triathletes allows coaches to pay attention to possible associated variables that may influence their good or poor sleep quality, affecting their recovery. Such findings are important for coaches due to the relationship between sleep quality and the prevalence of injuries (de Sousa Nogueira Freitas et al., 2020), illnesses (Silva et al., 2022) decreased sports performance (Kisiolek et al., 2022), among others. So, the present study aimed to characterize the sleep quality in male and female trained amateur triathletes aged 20 to 59 years.

2. Material and methods

Participants

Currently in Brazil there are approximately 25 thousand amateur triathletes (www.cbtri.com). Therefore, considering a confidence interval of 95% for the proportion of the sample and a margin of error of 10%, the sample size required for the present study is 96 triathletes (Serdar et al., 2021). The sample consisted of 151 amateur trained triathletes, 108 male and 43 female triathletes. Amateur trained, consists of participating in local competitions, training at least three times a week, identifying with the sport, training with a competitive purpose and developing sports skills (McKay et al., 2022). The sample characteristics (age, triathlon training experience, and training frequency) are shown in table 1.

Table 1
Participant characteristics (n = 151)

Characteristics	Male (*n* = 108)	Female (*n* = 43)
Age (years)	38.6 ±8.1	39,3 ±7.6
Triathlon Training experience (years)	5.8 ±4.3	4.8 ±3.3
Training Frequency (days/week)	6.3 ±0.9	6.5 ±0.6
Training Hours (per day)	3.4 ±1.7	3.2 ±1.5
Training Hours (per week)	20.4 ±5.3	20.8 ±5.8
Height (cm)	175 ±0.10	168 ±0.08
Weight (Kg)	79.3 ±3.2	66 ±2.7
Body Massa Index	25.6 ±2.7	24.5 ±1.0

Source: Own authors.

All male and female volunteers should be healthy, training without interruptions for at least 06 months and composing the three stages of the triathlon weekly in their training. All volunteers were at the beginning of the pre-competitive period, aiming to participate in the respective local championships.

Only triathletes who voluntarily decided to participate, signing the Informed Consent Form, participated in the study. The ethics committee in human research approved in 06/01/2021 the present study for research with human beings at the State University of Vale Acaraú with the number 4.749.908.

Procedures

All data collection took place remotely, in a virtual environment, via google forms. Volunteers were invited through the social networks of their respective clubs and advisory services where they trained.

After acceptance, a link to the electronic form was sent, containing the consent form on its first page, which, when read in full and accepted, followed up with the instruments for the acquisition of data on the sleep quality of the athletes.

Instruments

Pittsburgh Sleep Quality Index (PSQI-Br)

The PSQI is an instrument in the form of a questionnaire that measures sleep quality in the last 30 days. Developed by Buysse et al. (1989) and later cross-culturally validated for Brazil by Bertolazi et al. (2011), then identified as PSQI-Br.

The instrument consists of 19 items that measure seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The PSQI-Br total score is evaluated by adding the points for each component, generating a global score. Total values below 05 points indicate good sleepers, and values equal to or greater than 05 points indicate poor sleepers, and the higher the total score, the worse the sleep quality of those who answered the instrument. In the present

study, the reliability of responses to items using the Cronbach's alpha measure was 0.71 (Landis & Koch, 1977).

Statistical analyses

Response data for each instrument component were analyzed using absolute and relative frequency. All data and by category are presented as mean, median, and standard deviation. The standard error of the mean was calculated to provide a measure of the relative reliability of the collected means. In addition to the previous analyses, a 95% confidence interval (CI) for the mean was constructed. All data were analyzed using SPSS 23.0.

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3. Results

Below (Table 2) are the absolute and relative values separated between males and females of the answers to each item of the seven components of the PSQI-Br. (Vieira da Silva Neto et al., 2024).

Table 2.

Absolute (N) and relative (%) frequencies of the PSQI-Br components for Male and Female.

		PSQI-Br			
		Male		Female	
		N	%	N	%
Subjetive sleep quality	Very good	15	13.9	13	30.2
	Fairly good	65	60.2	28	65.1
	Fairly bad	27	25	2	4.7
	Very bad	1	0.9	0	0
Sleep latency	≤15 min	29	26.9	14	32.6
	16-30 min	44	40.7	20	46.5
	31-60 min	30	27.8	9	20.9
	>60 min	5	4.6	0	0
Sleep duration	≥7 h	20	18.5	14	32.6
	≥6-7 h	67	62.0	23	53.5
	<6 h	19	17.6	6	14
	<5 h	2	1.9	0	0
Habitual sleep efficiency	≥85%	107	99.1	37	86
	75-84%	1	0.9	5	11.6
	65-74%	0	0	1	2.3
	<65%	0	0	0	0
Sleep disturbances	0	2	1.9	2	4.7
	1-9	57	52.8	28	65.1
	10-18	47	43.5	12	27.9
	19-27	2	1.9	1	2.3
Use of sleep medication	None	93	86.1	35	81.4
	Less than once per week	7	6.5	4	9.3
	Once or twice a week	3	2.8	2	4.7
	Three or more times a week	5	4.6	2	4.7
Day time dysfuction	0	15	13.9	13	30.2
	1-2	52	48.1	17	39.5
	3-4	31	30.2	13	30.2
	5-6	10	9.3	0	0

Source: Own authors.

We can characterize the sleep quality of female triathletes in Table 3. In these results, according to the median and mean per age group and overall, all triathletes have poor sleep quality and are classified as poor sleepers, reinforced by the confidence interval present in the table.

Table 3.
Characterization of the PSQI-Br by Age group and Overall of Female Amateur Triathletes.

Age Group	N	Median	Mean	Standard deviation	Standard error	95 % CI of Mean
25-34	14	5	5	2.1	0.57	3.76 – 6.24
35-44	18	5	5.22	2.0	0.48	4.19 – 6.25
45-54	11	6	5.45	2.1	0.65	4.00 – 6.91
Overall	43	5	5.21	2.0	0.31	4.57 – 5.85

Source: Own authors.

When analyzing the results of the male triathletes, we can verify a pattern similar to that of the female group since all age groups and the total male sample have PSQI-Br values above 5 scores, both in the median and in the mean. Furthermore, the confidence intervals are all within the range that classifies the triathletes as poor sleepers and with poor sleep quality, see results in Table 4.

Table 4
Characterization of the PSQI-Br by Age group and Overall of Male Amateur Triathletes

Age Group	N	Median	Mean	Standard deviation	Standard error	95 % CI of Mean
20-29	16	5.5	5.94	2.62	0.65	4.54 – 7.33
30-39	48	6.5	6.44	2.55	0.36	5.70 – 7.18
40-49	35	6.0	6.03	2.20	0.37	5.27 – 6.79
50-59	9	7	7.44	1.81	0.60	6.05 – 8.84
Overall	108	6	6.31	2.40	0.23	5.86 – 6.77

Source: Own authors.

4. Discussion

The present study aimed to characterize the sleep quality of male and female trained amateur triathletes, building consultation references for professionals who work directly with the performance and health of athletes involved in triathlon. In summary, all triathletes were classified as poor sleepers, having an overall PSQI score ≥ 5.

When analyzing the results of the age groups in Table 3, we can consider that all Triathletes are poor sleepers and have a poor sleep quality (Buysse et al., 1989; Bertolazi et al., 2011), based on means and medians (Nakagawa & Cuthill, 2007; Lee, 2016) of PSQI-Br. By analyzing all the indicators of the general sample, we can say those female amateur triathletes have poor sleep quality, being classified as poor sleepers (Buysse et al.,1989; Bertolazi et al., 2011).

Some factors may explain these results found in women, which may be associated with social and cultural aspects such as working hours, domestic work and family care. (Tang et al., 2017; Nordin et al., 2005). Furthermore, although biological factors are associated with changes

in sleep, sexual differences have also been noted and discussed in the literature due to chronic hormonal differences in women, over the years (Mallampalli & Carter, 2014), which are relevant to poor sleep quality in female triathletes.

On the other hand, considering the results of male Triathletes, both by age group and overall, we can see that the entire sample has poor sleep quality, being classified as poor sleepers. Indeed, this is a common pattern of sleep quality that has been shown both for general male populations (Matsui et al., 2021) and for the sports population (Swinbourne et al., 2016; Biggins et al., 2018).

In summary, the findings presented in Table 3 and 4 show indicators that can negatively affect the health and performance of Triathletes. The literature indicates that people who experience reduced sleep (≤7h) or insufficient sleep are more likely to have illnesses, such as upper respiratory tract infections (Robinson et al., 2021), as well as a greater chance of becoming injured (Johnston et al., 2020; Huang & Ihm, 2021).

Additionally, some findings support that poor sleep quality also reduces muscle strength (Knowles et al., 2018), impairs decision-making, speed, and accuracy of task performance, post-recovery-exercise (Troynikov et al., 2018), and negatively alters important metabolic aspects (Besedovsky et al., 2019), which are directly associated with the sports performance in triathletes. One factor that may explain poor sleep quality in triathletes is the option to train more, thus impacting the duration and sleep quality (Sargent et al., 2014). Considering the results of the present study for male and female triathletes, actions such as promoting sleep hygiene practices or educational actions to improve sleep quality are necessary.

The main limitation of the present study is that sleep quality was not measured by objective measures such as polysomnography or actigraphy. Thus, the results are subject to subjective biases that the PSQI-Br presents. However, it is worth mentioning that the PSQI is a well-accepted and used instrument in the literature, in addition to being reliable in what it proposes to measure (Ibáñez et al., 2018). The fact that we did not collect data on marital status or number of children also creates a limitation. Another limitation is that when categorizing by age, some groups have a small sample size, thus reducing the explanatory power of the results for these specific cases.

The present study can offer a practical way for professionals to monitor trained amateur triathletes. These indicators can be helpful in the management of sleep and its quality, allowing bold decisions involving the sleep of Triathletes.

5. Conclusion

Thus, we can conclude that male and female trained amateur triathletes have poor sleep quality, in addition to being poor sleepers, which can might potentially lead to several negative outcomes for health and performance, with these findings being more accurate mainly due to the standard error of the measurement presented in this study. With this, our study can provide parameters, so that when analyzing the sleep quality, triathletes or their coaches can see if they are above, within or below the results, thus allowing decision-making to modify the sleep quality.

Contributions: Luiz Vieira da Silva Neto (A-B-C-D-E), Tatiana Albuquerque Melo Kramer (A-B-C-D-E), Gloria Maria Alves Trajano (A-B-C-D-E) and Luiz José Frota Solon Júnior (A-B-C-D-E)

A-Financing, **B-**Study design, **C-**Data collection, **D-**Statistical analysis and interpretation of results, **E-**Manuscript preparation

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