INFLUENCE OF SWIMMING ON SLEEP AND QUALITY OF LIFE OF PEOPLE WITH VISUAL IMPAIRMENTS

INFLUÊNCIA DA PRÁTICA DE NATAÇÃO NO SONO E NA QUALIDADE DE VIDA DE PESSOAS COM DEFICIÊNCIA VISUAL

INFLUENCIA DE LA PRÁCTICA DE NATACIÓN EN EL SUEÑO Y EN LA CALIDAD DE VIDA DE PERSONAS CON DISCAPACIDAD VISUAL

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ABSTRACT

Introduction: Physical exercise can bring important benefits in the areas of physical and psychological health and behavioral aspects. However, there have been few studies that link physical exercise and sleep in people with disabilities. Objective: This study aims to analyze the benefits promoted by swimming in the health and quality of sleep of visually impaired people of different levels of physical fitness. Methods: Thirty male volunteers, visually impaired, aged 16-60 years, took part in the study. The volunteers were divided into three groups: irregularly active (G1), swimming twice a week (G2), and swimming five times a week (G3). Questionnaires related to sleep pattern (Pittsburgh), sleepiness (Epworth), chronotype (Horne and Östberg) and quality of life (SF-36) were applied. Results: The main results showed that G3 presented better quality of sleep, as well as more effective sleep, compared to the other two groups. In addition, G1 showed poorer scores for quality of life compared to G3 in the domains general health, vitality, and social aspect. Conclusion: We suggest that more frequent physical activity (swimming) has a positive effect on quality of sleep and quality of life of people with visual impairments. ***Level of evidence III, case control study.***

Keywords: Swimming; Visually impaired persons; Sleep; Quality of life.

RESUMO

Introdução: A prática do exercício físico pode trazer benefícios importantes no âmbito físico, psicológico e comportamental. No entanto, a literatura é escassa ao relacionar exercício físico e sono nas pessoas com deficiência. Objetivo: Este estudo teve como objetivo analisar os benefícios que a natação promove na saúde e na qualidade do sono de deficientes visuais com diferentes níveis de aptidão física. Métodos: Participaram da pesquisa 30 voluntários do sexo masculino, deficientes visuais, com idade entre 16 e 60 anos distribuídos em três grupos, a saber, irregularmente ativos (G1), praticantes de natação 2 vezes por semana (G2); e praticantes de natação 5 vezes na semana (G3). Foram aplicados os questionários relacionados ao padrão de sono (Pittsburgh), sonolência (Epworth), cronotipo (Horne e Östberg) e qualidade de vida (SF-36). Resultados: Os principais resultados mostraram que o G3 apresentou melhor qualidade de sono, bem como maior eficiência do sono com relação aos outros dois grupos. Além disso, o G1 demonstrou piores escores para qualidade de vida com relação ao G3 nos domínios estado geral de saúde, vitalidade e aspecto social. Conclusão: Dessa forma, podemos sugerir que a frequência maior na prática da atividade física (natação) atuou positivamente sobre a qualidade do sono e a qualidade de vida de pessoas com deficiência visual. ***Nível de evidência III, Estudo de caso controle.***

Descritores: *Natação; Pessoas com deficiência visual; Sono; Qualidade de vida.*

RESUMEN

Introducción: La práctica del ejercicio físico puede traer beneficios importantes en el ámbito físico, psicológico y comportamental. Sin embargo, la literatura es escasa al relacionar ejercicio físico y sueño en las personas con discapacidad. Objetivo: Este estudio tuvo como objetivo analizar los beneficios que la natación promueve en la salud y en la calidad del sueño de discapacitados visuales con diferentes niveles de aptitud física. Métodos: Participaron en la investigación 30 voluntarios del sexo masculino, discapacitados visuales, con edad entre 16 y 60 años, divididos en tres grupos, a saber, irregularmente activos (G1), practicantes de natación 2 veces por semana (G2) y practicantes de natación 5 veces por semana (G3). Fueron aplicados los cuestionarios relacionados con el patrón de sueño (Pittsburgh), somnolencia (Epworth), cronotipo (Horne y Östberg) y calidad de vida (SF-36). Resultados: Los principales resultados mostraron que G3 presentó mejor calidad de sueño, bien como mayor eficiencia del sueño con relación a los otros dos grupos. Además, G1 demostró peores puntajes para calidad de vida con relación a G3 en los dominios estado general de salud, vitalidad y aspecto social. Conclusión: De esa forma, podemos sugerir que la frecuencia mayor en la práctica de actividad física (natación) actuó positivamente sobre la calidad del sueño y la calidad de vida de las personas con discapacidad visual. ***Nivel de evidencia III; Estudio de caso control.***

Descriptores: *Natación; Personas con daño visual; Sueño; Calidad de vida.*

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INTRODUCTION

It is well reported in the literature that people with disabilities have different sleep disorders, as well as changes in sleep patterns[1,2].

Studies show that most sleep problems among blind individuals are related to increased sleep latency, fragmented sleep, short sleep duration, and daytime naps[3,4]. Leger et al.[3], when evaluating blind individuals with circadian rhythm in free course, have shown a reduction in the duration and efficiency of sleep, as well as an increase in latency for REM sleep, compared to individuals without visual impairment. Corroborating with the results, the study by Aubin et al.[5] demonstrated that visually impaired people in free course presented increased sleep latency and wake time; however, those who were not in free course presented a sleep pattern similar to sight control.

In addition, it is also well established in the literature that sleep quality is related to quality of life. Some studies report that problems related to sleep, such as difficulties to start or maintain sleep, non-restorative sleep, and excessive daytime sleepiness, decrease quality of life in the general population[6,7]. In the case of Paralympic athletes, the literature suggests that the perception of quality of life is reduced in those with visual impairments[8].

The relationship between sleep, quality of life, and physical activity may be influenced by factors such as physical fitness level, exercise intensity, duration and type of physical activity performed[9,10]. The intensity of physical activity has a direct relationship with sleep quality, and physical activity performed at high intensity can have negative effects on sleep quality[11]. Studies with Paralympic athletes have shown that they present changes in sleep pattern, as well as sleep disorders[12,13].

Swimming for the visually impaired people is a viable option and, when properly oriented, becomes a safe exercise capable of bringing several benefits, such as: motor development, self-knowledge, postural correction, balance, spatial orientation, and increased quality of life[14].

In this context, the need to assess sleep and quality of life of people with visual impairments who practice physical activity becomes important, since they have a great influence on the health of this population. Thus, the present study aimed to analyze the benefits that swimming promotes in sleep and in the quality of life of visually impaired people with different levels of physical fitness.

METHODS

Participants

Thirty visually impaired men aged 16-60 years were selected for this study. It was approved by the Unicamp Research Ethics Committee (658,272), in accordance with CNS Resolution no. 466/12 and the 1995 Helsinki declaration.

The volunteers were distributed in three groups, one being irregularly active and two practicing physical activity regularly. The distribution of the physical activity groups was performed according to the frequency and intensity of the activity.

Group 1: did not practice any physical activity regularly.

Group 2: practiced swimming twice a week with low intensity, for one hour a day, and did not take part in competitions.

Group 3: practiced swimming every day of the week (Monday to Friday), with moderate intensity, for one hour a day, participating in amateur competitions.

Swimming practitioners were asked to provide a receipt specifying their functional sports classification. This classification separates the visually impaired people into three categories (B1, B2, and B3), characterized through the LogMAR scale and computerized visual field test. Thus, B1 is characterized with visual acuity lower than LogMAR 2.60; B2, with visual acuity between LogMAR 1.50-2.60 and/or visual field restricted to a diameter of less than 10 degrees; and B3, with visual acuity between LogMAR 1.40-1 and/or visual field restricted to a diameter of less than 40 degrees[15].

Experimental design

Sample selection was carried out in two locations. The irregularly active group was contacted through institutions that provide care to people with visual impairments. The group practicing physical activity was selected in a Paralympic sports club. After being contacted, understanding the explanation of the project, reading and signing the Informed Consent Form (ICF), the volunteers answered questionnaires related to sleep patterns, sleepiness, chronotype (circadian preference), and quality of life. The questionnaires were applied by the researcher, individually and in a private room at the Institutions, where he read the questionnaires and the volunteer pointed out the response that best answered his condition.

Experimental Protocol

Chronotype Questionnaire

The Morningness–Eveningness Questionnaire (MEQ) questionnaire, adapted for Portuguese[16], was used to determine the profile of circadian preference. This questionnaire classifies individuals into: morning (individuals who prefer to go to bed early and are more active in the early hours of the day), indifferent (individuals who have no preference and adapt to any time), and evening (individuals who are more active at night, and prefer to prolong their morning rest. The questionnaire is based on 19 multiple alternative questions about preference and/or the possibility of choosing the time to practice activities, sleep, and wake up. The result is given by a numerical value, which varies between 16 and 86 points, classifying the individual in: evening (16 to 41 points), indifferent (42 to 58 points), and morning (59 to 86 points).

Sleep Quality Questionnaire

The Pittsburgh Questionnaire (Pittsburgh Sleep Quality Index – PSQI), adapted to Portuguese (PSQI-BR)[17], was used to indicate the sleep quality index of the volunteers. The questionnaire consists of 21 items that assess sleep quality and its disorders by recording the last month in the components: sleep latency, sleep duration, sleep efficiency, sleep disorders, use of medications, and dysfunctions during the day. The classification criterion is based on the total score obtained, grouping the participants' sleep as good (below 4 points) or poor (equal to 5 or higher).

Sleepiness Questionnaire

To measure the degree of sleepiness of the volunteers, the Epworth Sleepiness Scale – ESS[18], adapted to Portuguese (ESS-BR)[17], was used. The score is based on the report of sleepiness episodes in different situations and environments, with values equal to or greater than 10 points indicating sleepiness. In addition to the evaluative character, in other studies, the ESS questionnaire can help in the diagnosis of sleep-related disorders[18].

Quality of Life Questionnaire

To assess the Quality of Life of the volunteers, the Quality of Life Questionnaire "Medical Outcomes Study 36-Item Short-Form Health Survey" (*SF-36)*, adapted to Portuguese[19], was used. It consists of a multidimensional questionnaire formed by 36 items, encompassed in 8 scales or domains, which are: functional capacity, physical aspects, pain, general health status, vitality, social aspects, emotional aspects, and mental health. It presents a final score from 0 (zero) to 100 (obtained by calculating the *Raw Scale),* where *zero* corresponds to the worst general health status and 100 corresponds to the best health status.

Statistical analysis

The results were analyzed using Statistic 7.0. The Kolmogorov-Smirnov test was used to assess data distribution, with one-way ANOVA being performed for parametric data and Kruskal Wallis test for non-parametric data. The results were represented as mean ± standard error. The significance level considered was $p<0.05$ for the rejection of the null hypothesis.

RESULTS

The list of the functional classification of participants in groups 1 (n=10), 2 (n=10), and 3 (n=10) is described in Table 1. G2 did not include any individual from category B3.

Regarding sleep quality, assessed by the Pittsburgh Questionnaire, G3 presented the lowest score (PSQI), showing a better sleep quality and also greater sleep efficiency compared to G1 and G2 (Table 2).

No statistically significant differences were found for sleepiness between G1 (9.1±3.38), G2 (9.60±5.18), and G3 (7.20±4.02 – one-way ANOVA, $p>0.05$), as well as for functional classifications B1, B2, and B3.

The results related to the frequency of chronotype distribution (Figure 1) showed that the vast majority were classified as morning (66.67%), followed by indifferent (26.67%) and evening (6.67%). However, no statistically significant differences were found in the chronotype scores when comparing the three groups (ANOVA, $p>0.05$).

Regarding quality of life, G1 presented significantly reduced scores in the domains of functional capacity ($F_{(2.27)}=10.408$, $p=0.00045$) and pain ($F_{(2.27)}=6.1499$, $p=0.00630$) compared to G2 and G3, and in the domains general health status ($F_{(2.27)}=4.8535$, $p=0.01582$), vitality ($F_{(2.27)}=3.8836$, $p=0.03293$), and social aspects ($F_{(2.27)}=4.7809$, $p=0.01669$) compared to G3 (Figure 2).

Table 1. Distribution of functional classification in the groups.

	Group 1	Group 2	Group 3
B1	3	6	3
B2	3	4	4
B3	1	0	2

Legend: B (Blind). Group 1: irregularly active; Group 2: 2 times/week; Group 3: 5 times/week. Three athletes from G1 did not have a functional classification, as well as one athlete from G3.

Table 2. Sleep Quality Questionnaire (Pittsburgh).

	Group 1	Group 2	G3
Sleep Latency (min)	26±3.55	23.50±5.11	20.50±5.65
Sleep Efficiency (%)	96.20±1.66	96.75±2.18	97.36±1.17*
PSQI Score (index)	5.60±0.74	5.50±0.75	3.50±0.82*

Legend: * differs in groups G1 and G2 (Kruskal Wallis, $p<0.05$). Group 1: irregularly active; Group 2: 2 times/week; Group 3: 5 times/week. Pittsburgh Sleep Quality Index (PSQI).

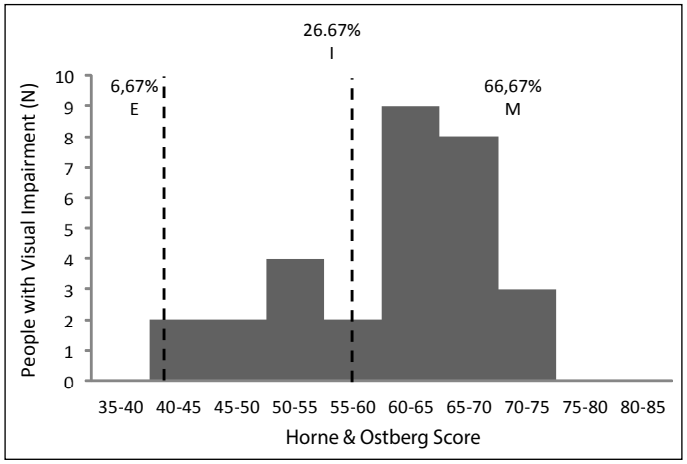

Figure 1. Frequency of distribution of volunteers according to the chronotype questionnaire (MEQ). Classification: E: evening < 41, I: indifferent > 42 < 58, and M: morning: > 59.

When analyzing quality of life considering the functional classification, it was found that G1 participants classified as B1 presented lower statistically significant scores for general health status ($F_{(2.9)}=8.0156$, $p=0.01002$) and vitality ($F_{(2.9)}=9.9000$ $p=0.00533$) compared to G2 and G3. G1 participants classified as B2, in turn, presented lower statistically significant scores for functional capacity ($F_{(2.8)}=8.5877$, $p=0.01020$), pain ($F_{(2.8)}=15.605$, $p=0.00173$), and social aspects ($F_{(2.8)}=4.6195$, $p=0.04638$) compared to G2 and G3 (Figure 3).

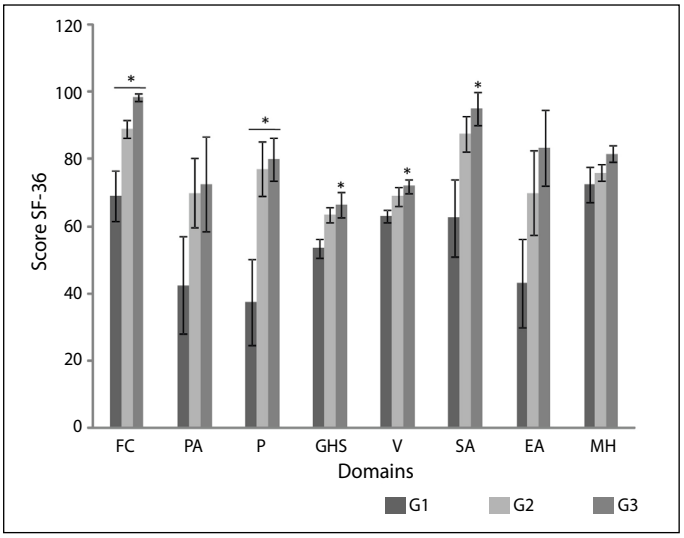

Figure 2. Results of the Quality of Life Questionnaire (SF-36) in the different groups. One-way ANOVA – * Differs from G1, $p < 0.05$. FC: functional capacity; PA: physical aspects; P: pain; GHS: general health status; V: vitality; SA: social aspects; EA: emotional aspects; MH: mental health. Group 1: irregularly active; Group 2: 2 times/week; Group 3: 5 times/week.

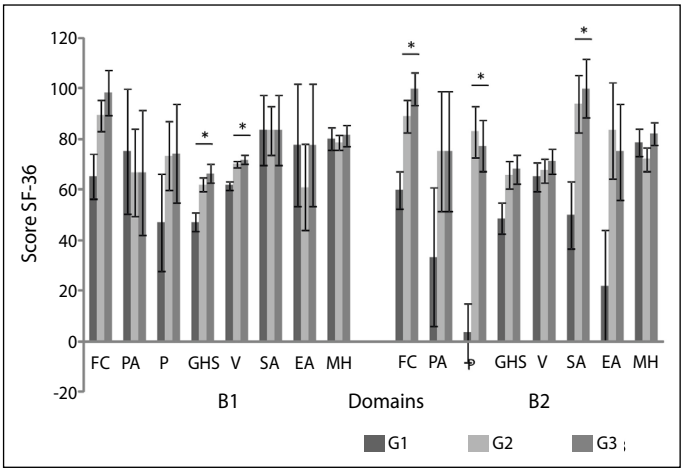

Figure 3. Results of the Quality of Life Questionnaire (SF-36) in the different groups, considering the functional classification (Blind: B1 and B2). One-way ANOVA – * Differs from G1, $p < 0.05$. FC: functional capacity; PA: physical aspects; P: pain; GHS: general health status; V: vitality; SA: social aspects; EA: emotional aspects; MH: mental health. Group 1: irregularly active; Group 2: 2 times/week; Group 3: 5 times/week.

DISCUSSION

This study evaluated the influence of swimming on sleep and quality of life of visually impaired people with different levels of physical fitness. The results showed that G3 had a lower sleep quality score (PSQI), presenting better sleep quality and sleep efficiency. Regarding quality of life, G1 had the worst scores for the domains of general health, vitality, and social aspects, compared to G3.

According to the study by Tamura et al[20], sleep-related problems are seen more frequently in individuals with visual impairment compared to people without visual impairment; in addition, complaints are greater

among subjects without light perception, especially those related to circadian rhythm, and may be associated with a lower quality of life.

The relationship between sleep in high-performance athletes with disabilities is well described in the literature, demonstrating factors that can worsen the quality of sleep due to the training load and reduced rest period. However, there is a gap in reporting the influence of physical activity in amateur athletes, as well as in people who exercise less frequently.

In a study carried out with Chilean Paralympic athletes, practitioners of swimming, table tennis, blind soccer, weightlifting, and chair tennis, in preparation for the 2015 Pan American Games in Toronto (n = 44), the authors found that 78.7% of these athletes had a poor sleep quality, with 69.6% reporting insomnia and only 33.3% sleeping enough hours[13]. Another study, carried out with Australian swimming and athletics athletes, who did not have disabilities, showed that 64% mentioned having a lower quality sleep mainly before a major competition; in addition, 42.1% of the athletes presented daytime sleepiness[10]. Accordingly, Juliff et al.[12], using questionnaire assessments, found that 28% of athletes with disabilities suffer from sleep disorders during periods of heavy training. Pancotto et al.[21] observed, in swimming athletes with visual impairment, a worsening in sleep quality, as well as in sleep latency.

The results regarding the sleep pattern of this study showed that G3 (swimming practitioners 5 times/week) presented a lower score on the Pittsburgh questionnaire, that is, better sleep quality and greater sleep efficiency compared to G1 (irregularly active) and G2 (swimmers twice a week). These results may be justified due to the training routine of the athletes evaluated in this study, since, even though they are considered athletes for participating in amateur competitions, when compared to high performance athletes—who take part in competitions at international level, and with a very intense training load and volume—, they presented a better quality of sleep.

The results related to the characterization of the chronotype showed that the vast majority were classified as morning (66.67%), followed by indifferent (26.67%) and evening (6.67%). These results corroborate the study by Pancotto et al.[21], which showed a predominance of the morning chronotype in visually and intellectually impaired athletics athletes.

Concerning excessive sleepiness, our study did not identify significant differences between groups, however, G1 (9.1±3.38) and G2 (9.60±5.18) presented threshold values with a positive score for sleepiness (>10). In the study by Leger et al.[3], reduced total sleep time and other changes in sleep patterns were associated with the complaint of daytime sleepiness in people with visual impairment. These changes in sleep patterns, which may be related to the condition of free course, represent an additional challenge for these individuals. Perhaps this characteristic was present in G2, since this group had the largest number of participants in functional classification B1 (total blind).

In our study, higher quality of life scores were shown in the groups that practiced swimming, both for those who did not compete and those who took part in amateur competitions, presenting a better quality of life. Several authors[6,7,22]have already demonstrated that the practice of physical activity provides biopsychosocial benefits to individuals. G1 (irregularly active) presented lower scores in the domains of functional capacity and pain, compared to G2 and G3; and lower scores in the domains general health status, vitality, and social aspects, compared to G3. Miki et al.[22] examined the specific effects of wheelchair basketball on health-related quality of life. The SF-36 instrument was applied to a group of 81 athletes (21 quadriplegic and 60 paraplegic), and a significant association was verified between general health and weekly sport practice, showing that the higher the frequency of weekly exercises, the better the perceived quality of life.

Sleep-related problems can be considered as an important risk factor for lower quality of life among individuals with visual impairment [20]. The study by Tamura et al. [20] demonstrated an association between an irregular pattern of wakefulness/sleep and difficulty waking up at the desired time with a lower quality of life in individuals with visual impairment without light perception. In addition, it was found that from 48.9% to 57.40% of the people with visual impairment showed a reduction in quality of life, compared to the general population (31.30%) without visual impairment. [23]

For people with disabilities, the current focus has been on analyzing quality of life and not the limitations imposed by their condition. This idea was clearly reinforced by the creation of the International Classification of Functioning, Disability, and Health[24]. Functional independence has been emphasized as a relevant factor in quality of life, since it is an important marker of independence in the performance of daily activities.

CONCLUSION

In this context, this study has shown that a higher frequency in swimming practice had a positive influence on the sleep quality of people with visual impairment. However, positive changes in quality of life have already been noticed from swimming twice a week. Thus, people with visual impairment should be encouraged to participate in sports programs, which must be structured to receive them. This would promote the positive aspects of sport for people with disabilities, that is, social inclusion, increased quality of life, and improved sleep quality.

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REFERENCES

1. Zuculo GM, Knap CCF, Pinato L. Correlation between sleep and quality of life in cerebral palsy. Codas. 2014;26(6):447-56.
2. Ramos AR, Wallace DM, Williams NJ, Spence DW, Pandi-Perumal SR, Zizi F, et al. Association between visual impairment and sleep duration: analysis of the 2009 National Health Interview Survey (NHIS). BMC Ophthalmol. 2014;14:115.
3. Leger D, Guilleminault C, Santos C, Paillard M. Sleep/wake cycles in the dark: sleep recorded by polysomnography in 26 totally blind subjects compared to controls. Clin Neurophysiol. 2002;113(10):1607-14.
4. Leger D, Guilleminault C, Defrance R, Domont A, Paillard M. Prevalence of sleep/wake disorders in persons with blindness. Clin Sci (Lond). 1999;97(2):193-9.
5. Aubin S, Jennum P, Nielsen T, Kupers R, Ptito M. Sleep structure in blindness is influenced by circadian desynchrony. J Sleep Res. 2018;27(1):120–8.
6. Strine TW, Chapman DP. Associations of frequent sleep in sufficiency with health-related quality of life and health behaviors. Sleep Med. 2005;6(1):23-7.
7. Mello MT, Boscolo RA, Esteves AM, Tufik S. O exercício físico e os aspectos psicobiológicos. Rev Bras Med Esporte. 2005;11(3):203-7.
8. Kawashima M, Hiratsuka Y, Nakano T, Tamura H, Ono K, Murakami A, et al. The association between legal Japanese visual impairment grades and vision-related quality of life. Jpn J Ophthalmol. 2016;60(3):219-25.

9. Viana VA, Esteves AM, Boscolo RA, Grassmann V, Santana MG, Tufik S, et al. The effects of a session of resistance training on sleep patterns in the elderly. Eur J Appl Physiol. 2012;112(7):2403-8.

10. Flausino NH, Da Silva Prado JM, de Queiroz SS, Tufik S, de Mello MT. Physical exercise performed before bedtime improves the sleep pattern of healthy young good sleepers. Psychophysiology. 2012;49(2):186-92.

11. Martins PJF, Mello MT, Tufik S. Exercício e sono. Rev Bras Med Esporte. 2001;7(1):28-36.

12. Juliff LE, Halson SL, Peiffer JJ. Understanding sleep disturbance in athletes prior to important competitions. J Sci Med Sport. 2015;18(1):13-18.

13. Agüero SD, Jofre PA, Standen CV, Herrera-Valenzuela T, Cantillana CM, Robledo RP, et al. Calidad del sueño, somnolencia e insomnio en deportistas paralímpicos de elite chilenos. Nutr Hosp. 2015;32(6):2832-7.

14. Greguol M. Natação adaptada: em busca do movimento com autonomia. Barueri, SP: Manole; 2010.

15. International Blind Sports Federation (IBSA). Classification Manual for Classifiers. Disponível em: http://www.ibsasport.org/documents/files/144-1-IBSAClassification-Manual-classifiers.pdf Acesso em 06 de junho de 2020.

16. Benedito-Silva AA, Menna-Barreto LS, Marques N, Tenreiro S. A self-assessment questionnaire for the determination of morningness-eveningness types in Brazil. In: Hayes DK, Pauly JE, Reiter RJ (Org.). Chronobiology: its role in clinical medicine, general biology and agriculture, part B. New York: Wiley-Liss; 1990. p. 89-98.

17. Bertolazi AN. Tradução, adaptação cultural e validação de dois instrumentos de avaliação do sono: Escala de Sonolência de Epworth e Índice de Qualidade de Sono de Pittsburgh. Dissertação para obtenção do título de Mestre (Pós-Graduação em Medicina: Ciências Médicas) – Universidade Federal do Rio Grande do Sul – UFRGS, Porto Alegre, 2008. Disponível em: < http://www.lume.ufrgs.br/handle/10183/14041> Acesso em: 21/11/2017.

18. Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. Sleep. 1991;14(6):540-5.

19. Ciconelli RM, Ferraz MB, Santos W, Meinão I, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação de qualidade de vida SF-36 (Brasil SF-36). Rev Bras Reumatol. 1999;39:143-50.

20. Tamura N, Sasai-Sakuma T, Morita Y, Okawa M, Inoue S, Inoue Y. A Nationwide Cross-Sectional Survey of Sleep-Related Problems in Japanese Visually Impaired Patients: Prevalence and Association With Health-Related Quality of Life. *J Clin Sleep Med*. 2016;12(12):1659–67.

21. Pancotto HP, Silva AN, Esteves AM. Extension and restriction of sleep time in the physical performance of athletes with visual and intellectual disabilities: new possibilities. Brazilian Journal of Motor Behavior. 2019;13(4):104-12.

22. Miki Y, Kanayama C, Nakashima S, Yamasaki M. Health-Related Quality of Life in Active Persons with Spinal Cord Injury. Japanese J Phys Fit Sports Med. 2012;61(2):177–82.

23. Mori K, Kawano Y, Tada Y, Hida A, Nagasawa N, Inoue K, et al. Relationship of dietary intake and lifestyle factors to health-related quality of life in the community-dwelling elderly. J Nutr Sci Vitaminol. 2010;56(6):364–71.

24. World Health Organization. The International Classification of Functioning, Disability and Health – ICF. Geneva: World Health Organization; 2001.