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RESEARCH ARTICLE

EXAMINATION OF COACHES' DAYTIME SLEEPINESS LEVELS IN TERMS OF GENDER, PHYSICAL ACTIVITY LEVEL AND WAIST CIRCUMFERENCE

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ABSTRACT

Purpose: This study aims to examine coaches' daytime sleepiness levels in relation to gender, physical activity level, and certain anthropometric variables.
Materials and Methods: The study involved 330 coaches (173 women) from various sports in Istanbul. Daytime sleepiness was measured using the Epworth Sleepiness Scale, and physical activity levels were assessed with the International Physical Activity Questionnaire (IPAQ) short form. Anthropometric data (body weight, height, waist circumference) were self-reported.
Results: Female coaches had higher Epworth Sleepiness Scale scores than male coaches ($p < 0.05$). Male coaches had higher IPAQ scores, waist circumferences, and BMIs compared to female coaches ($p = 0.00$). There was no correlation between daytime sleepiness and BMI ($r = .066$) or waist circumference ($r = -.050$) ($p > 0.05$). A significant negative correlation was found between physical activity level and daytime sleepiness ($r = -113$, $p < 0.05$).
Conclusion: The study found a significant negative correlation between physical activity and daytime sleepiness, highlighting the importance of physical activity for sleep health. The young age of participants may limit the generalizability of these results, suggesting a need for further research with older adults.

Keywords: Physical fitness, Epworth Sleepiness Scale, trainer, gender

INTRODUCTION

Sleep is very important for the health of all living things. As well as improving immune functions and regulating appetite, sleep is also effective in other physiological processes that affect health. Moreover, sleep significantly affects health behaviours that require motivation and self-control, such as physical activity and healthy eating habits (1). In a study by Bediz and Günay (2), poor sleep quality during the COVID-19 pandemic resulted in a 58% increase and a 15% decrease in food consumption, respectively, among male para-athletes from swimming, soccer, and track and field.The common types of sleep problems frequently encountered in society are disorders such as insomnia, narcolepsy, restless legs syndrome and sleep apnea (3). Insomnia is characterised by an inability to fall asleep and stay asleep. Insomnia can also occur as a condition in which a person wakes up several hours early and is unable to continue sleeping. Insomnia may also manifest itself in a person as excessive sleepiness during the day, which can lead to functional impairment in the person's daily activities (3). Narcolepsy is a condition in which excessive daytime sleepiness occurs, as well as sudden muscle weakness. Restless legs syndrome is defined as a condition in which involuntary and unpleasant sensations occur in a person's legs (3). Sleep apnea is a sleep disorder characterised by repeated pauses in breathing during sleep. These pauses inhibit the person's normal breathing during sleep and cause short-term insomnia (3).

Daytime sleepiness is a feeling of excessive sleepiness during the day and outside normal sleeping hours. This condition can make it difficult for a person to continue their normal daily activities and can negatively affect their performance. Daytime sleepiness can be caused by a variety of reasons, which may include inadequate sleep, sleep disorders, stress, depression, anxiety, the side effects of medications, or other health problems. Long-term daytime sleepiness may reduce a person's quality of life, and a person may require treatment (4). Sleep deprivation can have negative effects on functionality at work, at school, when driving, and in social life, and can also lead to various diseases. Some disorders resulting from sleep deprivation include heart disease, kidney disease, high blood pressure, diabetes, stroke, obesity and depression (5). Furthermore, sleep deprivation poses a major safety risk, especially in some professions. For example, sleep deprivation may increase the risk of accidents in individuals such as pilots, truck drivers, shift workers and medical assistants (6). Lack of sleep in students may lead to decreased academic performance, mood imbalances, and general health problems (7), while sleep deprivation in teachers may have a negative impact on their teaching performance (8). Sleep deprivation in military personnel can cause problems such as attention and focus problems, decreased decision-making skills, slower reaction times, and physical and mental fatigue (9). Sleep deprivation in physicians not only carries a risk for the patients they care for, but also has a negative impact on their own health (10). As well as in physicians, inadequate sleep in nurses can negatively affect both their own health and the health of the patients they care for (11).

The risk of insomnia increases in individuals who do physical activity but have high obesity levels. Therefore, it can be argued that improving body composition will increase sleep quality (12). However, some studies also emphasise that physical activity is not necessarily associated with sleep quality in all populations, and state that the relationship between physical activity and subjective sleep duration depends on age and gender (13). It is striking that apart from a few studies examining the sleep health and daytime sleepiness levels of coaches as a professional group, there are not enough studies on this subject (14-18). Although the Centers for Disease Control and Prevention (CDC) recommend at least 7-9 hours of sleep per night for adults (19), some studies report that coaches do not get enough sleep and suffer from sleep disorders (15,18,20).

Therefore, due to the fact that there are not enough studies on the sleep health of coaches in our country, this study aimed to examine the daytime sleepiness levels of coaches in terms of gender, physical activity level and some anthropometric variables. The hypotheses of the study are: 1) as waist circumference increases, daytime sleepiness level also increases, 2) as physical activity level increases, daytime sleepiness level decreases, and 3) daytime sleepiness levels of female coaches are higher than those of male coaches.

MATERIALS AND METHODS

Population and Sample

The sample size of the study was determined by the proportional sample size formula (18). Accordingly, it was determined that 186 participants out of a total of 350 coaches working in the Bağcılar district would be sufficient to conduct the study, with a 95% confidence interval and 5% margin of error. The sample of the study consists of 330 coaches (173 women and 157 men) working in various sports clubs in Bağcılar, Istanbul.

The criteria for inclusion in the study were determined as being at least 18 years of age, having a coaching certificate, having at least 2 years of coaching experience, and being an active coach. Those under the age of 18, those who did not have a coaching certificate and those who were not actively coaching were excluded from the study. The study was approved by Trakya University, Faculty of Medicine Non-Interventional Clinical Research Ethics Committee with protocol number TÜTF-GOBAEK 2023/186 (Date: 24.04.2023, Decision No: 07/26). Throughout the study, all practices were carried out in accordance with the Declaration of Helsinki.

Data Collection Tools

The study data were collected using Google Forms.

Personal Information Form

Personal information of the participants was collected with the form created by the researcher. This form includes questions about participants' gender, age, height, weight, sports branch, previous experience in sports, and number of years spent in coaching.

International Physical Activity Questionnaire (IPAQ)

The participants' physical activity levels were determined with the short form of the International Physical Activity Questionnaire (IPAQ), whose Turkish validity and reliability study was conducted by Öztürk (21). The questionnaire was developed to report the physical activity levels of people in daily life based on self-reports. The questionnaire basically includes questions about physical activity lasting at least 10 minutes during the day in the last week. In the questionnaire, participants are asked how many days and for how long during the last week they have participated in vigorous, moderate and walking activities, each lasting at least 10 minutes (21, 22).

Application Protocol: Physical activity level is determined by the metabolic equivalent of task (MET) method. The reference MET value is set at 3.5 ml/kg/min. According to this formula, the amount of oxygen consumed by the individual at rest is 3.5 ml per kg per minute. Three different references are used to determine the MET level in the scale. Accordingly, vigorous physical activity is defined as 8 METs, moderate physical activity is defined as 4 METs, and walking activity is defined as 3 METs. It is determined how many days and how many minutes a week the coaches exercise in these three groups, and the total MET value is calculated by summing the MET values for the three different physical activity levels (22,23).

Epworth Sleepiness Scale (ESS)

This is a questionnaire whose Turkish validity and reliability study was conducted by İzci et al. (24), and which consists of 8 questions to assess a person's daytime sleepiness. The scale is based on self-report, and includes questions about the individual's general daytime sleepiness. It assesses sleep status and tendency to doze off during certain activities of daily life (sitting and reading, watching television, sitting inactive in a public place, as a passenger in a car, lying down to rest in the afternoon, sitting and talking to someone, sitting quietly after lunch without alcohol, and in a car while stopped for a few minutes in traffic) (24). The evaluation range of the questions in the scale is between 0-3 points, and the maximum score that can be obtained is 24 points. During the evaluation phase, the participants' responses are collected and if the result is between 2-10 points, the rate of sleepiness is normal, whereas if the result is higher than 10 points, this indicates a high rate of sleepiness (24,25).

Measurement of Body Weight, Height, and Waist Circumference

The participants' body weight and height were determined based on their own statements (self-reports). Prior to the study, the participating coaches were explained how to measure their waist circumference in a video prepared by the researcher. In this video, the points to consider when measuring waist circumference were explained. For waist circumference measurement, the use of an inelastic tape measure was recommended, and the measurement was requested to be taken in the standing position at the narrowest level between the lower rib border and the uppermost border of the iliac bone, at the end of a normal exhalation (26). According to the World Health Organization (27), waist circumference should be less than 80 cm for women and 94 cm for men. A waist circumference over 88 cm in women and over 102 cm in men is considered to be an increased cardiometabolic risk factor (26).

Statistical Analysis

Data analysis of the study was carried out using the SPSS 22.0 program. The coaches' demographic characteristics were analysed with descriptive statistics. The obtained results are presented as arithmetic mean ± standard deviation ($\bar{x} \pm SD$). The Kolmogorov-Smirnov test was applied to determine whether the data showed a normal distribution, and it was determined that the data did not show a normal distribution. Therefore, non-parametric analyses were performed in the study. The Mann-Whitney U test, one of the non-parametric tests, was carried out for pairwise group comparisons, while Spearman's rho correlation analysis was performed to determine the correlation between parameters. The significance level for this study was set at $p < 0.05$.

RESULTS

The coaches' demographic and anthropometric characteristics, the comparison of their waist

Table 1. Comparison of demographic and anthropometric characteristics according to gender

	Gender	X ± SD	Mean Rank	Sum of Ranks	U	Z	p
Age (years)	Female	34.37 ± 4.91	155.37	26878.50	11827.500	-2.032	0.042*
	Male	35.81 ± 6.11	176.67	27736.50			
Height (m)	Female	1.74 ± 0.46	128.25	22188.00	7137.000	-7.457	0.000***
	Male	1.82 ± 0.47	206.54	32427.00			
Weight (kg)	Female	64.37 ± 11.86	123.42	21351.00	6300.000	-8.359	0.000***
	Male	76.96 ± 12.88	211.12	32934.00			
Waist Circumference (cm)	Female	73.26 ± 11.66	132.20	22870.00	7819.000	-6.671	0.000***
	Male	81.58 ± 12.69	202.20	31745.00			
BMI (kg/m^2)	Female	21.79 ± 4.38	139.68	24165.50	9114.500	-5.160	0.000***
	Male	24.11 ± 4.25	193.95	30449.50			
Experience in Sports (years)	Female	7.53 ± 3.21	173.14	29953.50	12258.500	-1.535	0.125
	Male	7.01 ± 3.42	157.08	24661.50			
Coaching Experience (years)	Female	3.88 ± 2.86	161.62	27959.50	12908,500	-0.785	0.433
	Male	4.66 ± 4.19	169.78	26655.50			

BMI: Body Mass Index. *** p<0,01

Table 2. Comparison of waist circumference and body mass index levels according to gender

	Gender	X ± SD	Mean Rank	Sum of Ranks	U	Z	p
BMI (kg/m^2)	Female	21.79 ± 4.38	139.68	24165.50	9114.500	-5.160	0.000***
	Male	24.11 ± 4.25	193.95	30449.50			
Waist Circumference (cm)	Female	73.26 ± 11.66	132.20	22870.00	7819.000	-6.671	0.000***
	Male	81.58 ± 12.69	202.20	31745.00			

BMI: Body Mass Index

Table 3. Comparison of sleepiness levels according to gender

	Gender	X ± SD	Mean Rank	Sum of Ranks	U	Z	p
Sleepiness Level	Female	8.01 ± 5.48	176.26	30493.00	11719.000	-2.156	0.03*
	Male	6.83 ± 5.40	153.64	24122.00			

circumference and body mass index levels, and the comparison of their sleepiness levels according to gender are given in Tables 1-3, respectively. The mean physical activity levels according to gender, the correlation of waist circumference and body mass index with sleepiness levels, and the correlation between physical activity levels and sleepiness levels are explained in Tables 4-6, respectively.

The age, height, weight, waist circumference, BMI, length of experience in sports and coaching experience of the coaches participating in the study were analysed according to gender using the Mann-Whitney U test. According to the results, a significant difference was found between genders in terms of age, height, weight, BMI and waist circumference measurements ($p < 0.05$). When the source of the significant difference was examined, it was determined that the difference originated from male coaches, except for experience in sports.

The BMI and waist circumference measurements of the coaches participating in the study were analysed according to gender using the Mann-Whitney U test. According to the results, a significant difference was found between genders in terms of BMI and waist circumference measurements ($p < 0.05$). When the source of the significant difference was examined, it

Table 4. Mean physical activity levels according to gender

Gender	X ± SD MET-min / week	Mean Rank	Sum of Ranks	U	Z	p
Female	4614.96 ± 3666.414	151.28	26172.00	11121.000	-2.842	0.00***

Table 5. Correlation of sleepiness levels with waist circumference and body mass index

		Sleepiness Level
BMI (kg/m^2)	r	0.066
	p	0.230
Waist Circumference (cm)	r	-0.050
	p	0.363

BMI: Body Mass Index

Table 6. Correlation between physical activity levels and sleepiness levels.

		Sleepiness Level
Total Physical Activity (MET-min / week)	r	-.113*
	p	.039*

* p < 0.05

was determined that this originated from male coaches in both measurements.

The sleepiness levels of the coaches participating in the study were analysed according to gender using the Mann-Whitney U test. According to the results, a significant difference in sleepiness level was found between genders ($p < 0.05$). When the source of the significant difference was examined, it was determined that this originated from female coaches.

The physical activity levels of the coaches participating in the study were analysed according to gender using the Mann-Whitney U test. According to the results, a significant difference was found between genders in total physical activity MET levels ($p < 0.05$). When the source of the significant difference was examined, it was determined that that this originated from male coaches.

No significant relationship was found between the coaches' sleepiness levels and their BMI ($r = .066$) or waist circumference ($r = -.050$) ($p > 0.05$).

A significant negative relationship was found between the coaches' physical activity levels and their daytime sleepiness levels ($r = -.113$) ($p < 0.05$).

DISCUSSION

This study aimed to examine coaches' daytime sleepiness levels in terms of gender, physical activity level and some anthropometric variables. The main findings of the study are: a) there is a significant difference between male coaches and female coaches in favour of male coaches in terms of physical activity level ($p < 0.05$); b) though not at pathological levels, daytime sleepiness levels of female coaches are higher than those of male coaches ($p < 0.05$); c) there is a significant negative relationship ($p < 0.05$) between the coaches' physical activity levels and their daytime sleepiness levels ($r = -.113$); d) no significant relationship was found between the coaches' sleepiness levels and their BMI ($r = .066$) and waist circumference ($r = -.050$) ($p > 0.05$). Based on the main findings of the study, it can be understood that study hypotheses 2 [as physical activity level increases, daytime sleepiness level decreases (Table 6)] and 3 [daytime sleepiness levels of female coaches are higher than those of male coaches (Table 3)] can be confirmed, while study hypothesis 1 [as waist circumference increases, daytime sleepiness levels also increase (Table 5)] cannot be confirmed.

It is reported that regular physical activity improves sleep quality, reduces sleep onset latency, increases total sleep quality, and is effective in controlling sleep disorders such as insomnia (29).

The American College of Sports Medicine (ACSM) recommends moderate-intensity activity for at least 30 minutes five days a week (150 minutes a week) or high-intensity activity for at least 20 minutes three days a week (60 minutes a week) for every adult individual (29).

Cuppett and Latin (30) evaluated the physical activity levels of 1200 certified athletic trainers using the Baecke Questionnaire of Habitual Physical Activity and found that 16% of the athletic trainers did not meet the physical activity level recommended by the ACSM. Additionally, in the study by Cuppett and Latin (30), it was determined that female trainers had higher physical activity scores than male trainers. In the same study, the mean ages of female trainers and male trainers were found to be 31.1 ± 6.8 years and 33.9 ± 8.6 years, respectively. Another result obtained in their study was that trainers aged 36 and over were less active than younger trainers (230). Although the male and female coaches in our study were 34-35 years old on average, age-related physical activity was not assessed.

In another study, in which 255 certified athletic trainers were evaluated in terms of general health and fitness habits, it was determined that 7% of the trainers were sedentary, while 42% met the physical activity level recommended by ACSM (31).

In our study, the physical activity levels of the coaches were evaluated with the International Physical Activity Questionnaire Short Form (IPAQ-SF) and both male and female coaches were assessed as physically active (≥3.000 MET-min/week) according to the IPAQ-SF assessment guideline (32). In our study, unlike the study by Cuppett and Latin (30), it was determined that the physical activity levels of male coaches were higher than those of female coaches.

It is known that increases in body fat mass lead to overweight or obesity and negatively affect sleep quality and duration (33). In a Wisconsin Sleep Cohort Study conducted with seven hundred participants, it was determined that a 10% increase in body weight increased the apnea-hypopnea index (AHI) score by 32%, whereas a 10% loss in body weight decreased the AHI score by 26% (34).

Although the body mass index (BMI) is not a perfect method for determining overweight or obesity, it is widely preferred by healthcare professionals because it is a practical method (35). However, in recent years, some researchers have stated that waist circumference (WC) is more effective than BMI in determining central obesity and health risks (26, 36-38). Davidson and Patel (39) stated that WC is more effective than neck circumference or BMI in detecting sleep disordered breathing (SDB). In our study, although both the BMI values and waist circumferences of male coaches were higher than those of female coaches, both groups had normal BMI and waist circumference values (Table 1) (27).

The inability to detect a significant relationship between sleepiness levels and waist circumference or body mass index in our study may be due to the young age of the coaches or the fact that their BMI and waist circumference values were within normal limits. In the study by Groth et al. (31), the mean BMI values of male and female trainers were determined as 25.78 (kg/m2) and 27.97 (kg/m2), respectively (30). Groth et al. (31) found that 53% (n = 72) of female trainers had a BMI in the healthy range, 25% (n = 34) were overweight, and 22% (n = 31) were obese. Of the male trainers, 26% (n = 31) had a healthy BMI, 50% (n = 60) were overweight, and 24% (n = 29) were obese.

In their study, Torres-McGehee et al. (15) examined the energy availability, mental health and sleep patterns of 47 certified athletic trainers from the southeastern US region (males = 23, age = 29.8 ± 8.5 years; females = 24, age = 28.9 ± 7.9 years). It was reported that 39 trainers participated in physical activity while 8 did not participate, and that 42 out of 47 coaches complained of sleep disorders. In their study, while the trainers' sleep quality was assessed with the Pittsburgh Sleep Quality Index, the trainers were only asked whether they participated in physical activity and it was not evaluated whether the level of physical activity was sufficient (15).

In a study conducted with the participation of 2.020 athletic trainers, Winkelmann et al. (18) stated that in the last week, 228 (18.6%) of the trainers had not done any physical activity, 455 (37%) participants had exercised less than 3 times, and 546 (44.4%) had exercised 3 or more times.

The American Academy of Sleep Medicine (AASM) and Sleep Research Society (SRS) state that adults should sleep at least 7 hours regularly every night (40). Although Winkelmann et al. (18) stated in their study that the trainers slept 5-8 hours every night, the fact that the data were collected based on a web-based survey rather than a standard data collection tool makes it difficult to interpret the results. In the same study, it was stated that 29 trainers slept 4 hours or less per night (2.4%), 1,117 coaches slept 5-8 hours (90.9%), and 83 coaches (6.8%) slept more than 8 hours.

In a study conducted with the participation of three basketball coaches and 12 female basketball players, both the Epworth Sleepiness Scale (ESS) scores and the Insomnia Severity Index of the coaches were found to be 4±2. These scores show that coaches aged 42 ± 15 years and with a mean BMI of 29 ± 7 (kg/m2) did not have a risk of sleep apnea or daytime sleepiness (16).

Another finding of our study is that, although not at pathological levels (Epworth Score > 10), daytime sleepiness levels of female coaches were higher than those of male coaches (8.01 ± 5.48 vs. 6.83 ± 5.40). Since no study could be found that evaluated coaches' daytime sleepiness levels in terms of gender, this finding of our study was compared with results obtained from the normal population. In this context, Sanford et al. (41), in a study conducted with the participation of 703 people between the ages of 20 and 98 from the American community, stated that the Epworth Sleepiness Scale (ESS) score did not differ in terms of gender or age. On the other hand, Miura and Honma (42) stated that premenstrual female Japanese students had higher ESS scores than their male peers (12.1 ± 4.8 vs. 9.4 ± 4.5). Similar to the results of the study by Miura and Honma (42), Putilov et al. (43) stated that excessive daytime sleepiness levels of female Russian university students were higher than those of their male peers.

According to another finding of our study (Table 6), as the coaches' physical activity levels increased (IPAQ Score increased), their daytime sleepiness levels decreased (ESS decreased). McClain et al. (13) stated that physical activity and daytime sleepiness levels depended on gender (men had lower daytime sleepiness levels than women) and age, and that as the level of physical activity increased in young (20-39) and elderly (≥60) individuals, the level of daytime sleepiness decreased, but this was not the case for middle-aged (40-59) individuals.

In a study conducted with the participation of 876 Brazilian female adolescents (16.4 ± 1.2 years), it was stated that the level of physical activity was inversely related to the Pediatric Daytime Sleepiness Scale (PDSS) score (44). Mahfouz et al. (45) also reported that mean Pittsburgh Sleep Quality Index (PSQI) scores were higher for physically inactive students than for moderately or highly active students.

In practice, the daytime sleepiness level, physical fitness level, and body composition of trainers should be monitored by health authorities or the relevant government department to prevent chronic diseases and increase job productivity during their service.

To our knowledge, this is the first study that attempts to explain the relationship between coaches' daytime sleepiness levels and their physical activity levels, body mass indices and waist circumferences. Since no other study could be found in the literature that attempted to explain the association between coaches' daytime sleepiness levels and their physical activity levels, body mass indices, and waist circumferences, we aimed to compare the results obtained from our study with those from the literature as much as possible

Limitations

The data obtained in this study explain the relationship between daytime sleepiness levels and gender, physical activity levels and waist circumference of coaches working in only one district of Istanbul. In order to generalize the results, coaches from different districts of Istanbul or different provinces of Turkey should be invited to participate in the study, and the study should be repeated with the participation of a larger number of coaches. One of the most important limitations of the study is that the coaches' height, weight and waist circumference were determined based on the coaches' own self-reports, without being measured by the researchers. This also applies to the scales used to determine physical activity level and daytime sleepiness. Completing the scales in question face-to-face instead of online (Google Forms) may produce different results.

CONCLUSION

The aim of this study was to examine coaches' daytime sleepiness levels in terms of gender, physical activity level and some anthropometric variables. İn line with the aim of the study, the coaches' daytime sleepiness levels were compared in terms of physical activity level, gender and waist circumference. Though not at a pathological level, female coaches had higher levels of daytime sleepiness. Male coaches' physical activity levels were higher than those of female coaches. There was no significant relationship of daytime sleepiness level with BMI or waist circumference. However, there was a negative significant relationship between physical activity level and daytime sleepiness level. In order to better understand the relationship between daytime sleepiness level and physical characteristics, gender and physical activity level, the study should be conducted with a larger sample and with the participation of coaches from different age groups.

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Author contribution: Methodology: CK, DK; Writing-Original Draft: CK, DK, FE; Investigation; CK, DK; Writing and Editing: CK, FE; Supervision: CK, FE, Statistical Analysis: CK.

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