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INVESTIGATION OF THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY LEVEL, POSTURE AND SLEEP QUALITY

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ABSTRACT

BACKROUND: The aim of our study was to examine the relationship between physical activity level, static posture and sleep quality in young adult individuals.

MATERIAL AND METHOD: 30 young adult volunteers were included in the study. The demographic and clinical characteristics of the individuals were evaluated with the "Demographic Information Form". The
Internatıonal Physıcal Activity Questionnaire- Short Form (IPAQ) was used fort the physical activity levels. “The postural analysis of the participants was performed with "Display Posture Imagine Assessment (DIPA) software”. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality.

OBSERVATION AND RESULTS: Lower physical activity level was associated with poorer lower extremity elignment scores. In addition, postural asymmetry was found to be higher in pelvis and knee regions in individuals with low sleep quality.

CONCLUSION: Low level physical activity and sleep quality are associated with worse postural outcomes.

KEYWORDS : Internatıonal Physıcal Activity Questionnaire- Short Form (IPAQ), Pittsburgh Sleep Quality Index (PSQI), physical activity level, posture, sleep quality

INTRODUCTION

The World Health Organization (WHO) describes physical activity as "any bodily movement produced by skeletal muscles that requires energy expenditure"1. Regular physical activity is known to be an important factor in the development of cognitive functions and in the prevention of chronic problems such as cardiovascular diseases, cancer and diabetes2. It has been reported that low physical activity is associated with many factors such as postural impairments and fatigue3. In addition, sedentary lifestyle habits causes a variety of musculoskeletal problems, leading to decreased coordinated movements of the muscles that provide spinal mobility and stability4.
The human body tends to stand up with the help of a high center of mass and a relatively small support base5. The ability to stand with a good posture requires the activation of many muscles simultaneously. This muscle activation occurs by the integration at higher levels of the central nervous system of afferent information from the visual, vestibular, and somatosensory systems and by the spinal reflexes6.

Sleep quality is another important issue related to the health of individuals. Evidence from recent studies shows that shorter sleep period has becıme a more common problem. Short sleep duration has been reported to be associated with worse health outcomes, including diabetes, heart disease and death7. The physical activity especially during periods of high stress, has been reported to provide positive changes in sleep, stress and general well-being9.

The level of physical activity is effective in the development of sleep quality10. It is also reported that physical activity including postural exercises restores muscle imbalance and provides postural improvement in younger individuals11. However, besides the head posture, the number of studies examining the thoracic region and shoulder complex and it's correlation with the balance is insufficient12. In addition, when studies were conducted, it was found that studies evaluating physical activity level, posture and sleep quality in young adult individuals were not found. Therefore, the aim of our study is to examine the relationship between physical activity level, sleep quality and static posture in young adult individuals.

MATERIALAND METHOD

30 young adult volunteers who were studying at a University, Faculty of Health Sciences, Physiotherapy and Rehabilitation department included in the study. The criteria for inclusion in the study were the absence of a central or peripheral origin balance problem that would lead to balance disorder, and an absence of an orthopedic problem involving the upper or lower extremity. The exclusion criteria were any known lower extremity problem history that would prevent the assessments.

The demographic and clinical characteristics of the individuals were evaluated with the "Demographic Information Form". The "International Physical Activity Questionnaire-Short Form (IPAQ)" was used to assess the physical activity levels. The IPAQ is a questionnaire that measure the health-related physical activity in populations13.

The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. The scale assesses sleep quality in the last one month and consists of 7 components. These components include; subjective sleep quality, sleep latency, sleep duration, usual sleep activity, sleep disturbance, sleeping aid use, and daytime sleep disorder. The sum of the scores of the components gives the total PSQI score (range 0 to 21). High score indicates poor sleep quality14.

The postural assessment of the participants was done with the Display Posture Imagine Assessment (DIPA) software v3.3". Postural assessment protocol; the anterior, lateral and posterior images were recorded. Prior to imaging, reference anatomical points identified by Furlanetto et al in the sagittal and frontal planes were marked with a marker 15. In postural analysis of the individuals head position, shoulder, scapular symmetry, pelvis horizontal asymmetry, knee Q angle, patellar position and leg length were assessed.

The SPSS 21.0 statistical package program was used for the analysis of the data. Descriptive statistics methods such as mean, standard deviation and frequency distribution were used in the evaluations. Normal distribution of variables was analyzed by Testi Shapiro-Wilk Test. Pearson correlation coefficient was used to determine the relationship between the continuous variables. $p<0.05$ was considered statistically significant.

OBSERVATION AND RESULTS The average values of age, BMI, IPAQ and PSQI values of 30 volunteers participating in the study are given in Table 1.

Table 1. Demographic and clinical features

Variables	Mean ±SD
Age (years)	22.4±1.9
BMI (kg/m2)	22.08±2.6
IPAQ total	2253.08±1482.75
PSQI total	6.55±2.83

SD: Standard Deviation; BMI: Body Mass Index; IPAQ: International Physical Activity Questionnaire PSQI: The Pittsburgh Sleep Quality Index.

The Relationships between physical activity level, posture and sleep quality are shown in Table 2. There was a negative correlation between the IPAQ total score and the right-left knee Q angle values (r=-0.44, p=0.02, r =-0.59, p=0.001 respectively). There was a positive correlation between PSQI total score and pelvis horizontal asymmetry value (r=0.40, p=0.04); and a negative correlation between PSQI total and right-left knee varus angle values (r=-0.38; p=0.04, r=-0.40; p=0.03, respectively).

	IPAQ (Total)	PSQI (Total)	STATIC POSTURE									
			Head position	Shoulder Sym.	Scapul Symm.	Pelvis Symm.	Q angle		Patellar position		Leg length	
							Right	Left	Right	Left	Right	Left
IPAQ (Total)		r=0.05 p=0.80	r= 0.48 p= 0.14	r= 0.36 p= 0.07	r= 0.03 p= 0.88	r= -0.07 p= 0.71	r= -0.44 p= 0.02*	r= -0.59 p= 0.001*	r= -0.32 p=0.09	r= -0.36 p=0.05	r= 0.28 p= 0.89	r=0.28 p=0.84
PSQI (Total)	r=0.05 p=0.80		r= -0.14 p= 0.48	r= -0.16 p= 0.41	r= -0.08 p=0.67	r= -0.40 p=0.04*	r= -0.10 p=0.61	r= -0.15 p=0.43	r= -0.02 p=0.89	r= -0.06 p=0.76	r= -0.40 p=0.84	r= -0.40 p=0.84

IPAQ: International Physical Activity Questionnaire; PUKI: Pittsburgh Sleep Quality Index; p <0.05 was significant; sym: Symmetry * Pearson correlation

DISCUSSION

As a result of our study that investigating the relationship between physical activity, posture and sleep quality in young adult individuals, high level of physical activity was associated with low right and left Q angle values. There was no significant relationship between physical activity level and sleep quality. Although low sleep quality was only statistically associated with hip asymmetry in the positive direction, it was observed that all other parameters were negatively affected.

When the literature is examined, it is observed that the number of studies that investigate the relationship between physical activity level and posture is limited. Most of the studies focused on the head posture. In addition, studies evaluating physical activity, posture and sleep quality have not been reached. Lee et al.16 investigated changes in the shoulder and head posture according to exercise methods and found that the exercise had positive effects on round shoulder and anterior head posture. Loprinzi et al.17 reported that physical activity had positive effects on sleep related parameters. Atkinson et al.18 reported that physical activity is an important factor for sleep quality in their review. WyszyNska et al.19 found that school-age children whith higher levels of physical activity had lower trunk inclination. Furtado et al.20 found that chronic low sleep quality had adverse effects on postural control in healthy individuals. In the study of Correa et al.11, it is reported that the combination of postural and breathing exercises have positive effect on the restoration of muscles and posture in school aged children. In our study, no significant relationship was found between physical activity and sleep quality. The level of physical activity was associated with the posture, but only with the posture of lower extremity. While there was positive correlation between sleep quality and pelvic symmetry, the correlation with other posture components (head position, shoulder and scapula symmetry, Q angle, patellar position and leg length) was not significant. Different and varied findings may be caused by different situations: First, the physical activity level of individuals was similar. Different results could be obtained at different levels of physical activity. Second, The evaluation methods used in the studies were different. In addition, the age group of the individuals varied in different studies.

One of the strengths of study is that it evaluates the relationship between physical activity, posture and sleep quality. In addition objective assessment are used for postural analysis of the individuals, it also includes analysis of several body parts (head, shoulder, scapula, pelvis, lower extremity). One of the limitations of our study is the use of a self-report based scale in assessing physical activity. Also, working in a larger sample may provide clearer results.

CONCLUSION

Our study showed that physical activity in young adult subjects has positive effects on both knee Q angles. Individuals with low sleep quality were found to have high pelvic asymmetry. Further studies need to be conducted on larger samples in order to obtain more accurate information.

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