Turkish Med. Stud. J. 2018; 5: 24-7 DOI: 10.4274/tmsj.2018.05.01.0002
Received: 04.04.2018 - Accepted: 16.04.2018

THE RELATIONSHIP BETWEEN CHRONOTYPES AND PHYSICAL ACTIVITY IN HEALTHY YOUNG MEDICAL STUDENTS

Oğuzhan Acet[1], Çağrı Girit[1], Şennur Kaya[1], Necdet Süt[2], Selma Arzu Vardar[3]

[1] Trakya University School of Medicine, Edirne, TURKEY
[2] Department of Biostatistics, Trakya University School of Medicine, Edirne, TURKEY
[3] Department of Physiology, Trakya University School of Medicine, Edirne, TURKEY

ABSTRACT

Aims: The aim of this study is to determine the relationship between circadian rhythm and physical activity in students of Trakya University School of Medicine ranging from 1st to 5th grade.

Methods: Horne & Östberg's Morningness-Eveningness questionnaire and International Physiological Activity Scale were used to compare physical activity and chronotype features of 1st to 5th grade students of Trakya University School of Medicine. Pearson Chi-Square and Kruskal-Wallis tests were used to evaluate the results of the study.

Results: This study included 351 medical students, of whom 143 were male and 208 were female. The mean age of the study population was 20.79 ± 1.9. There were 32 (9.1%) morning-type, 234 (66.5%) intermediate-type and 85 (24.4%) evening-type volunteers. Out of all, 102 (29.0%) were inactive, 177 (50.3%) minimal active and 73 (20.7%) active. There was no significant relationship between physical activity and chronotype differences between the study groups.

Conclusion: The findings of this study showed no relationship between physical activity and chronotype in healthy young medical students. Circadian preference may not be considered as an effective factor for daily physical activity.

Keywords: Exercise, circadian rhythm, medical student

INTRODUCTION

The circadian rhythm is defined as the changes in daily physiological and biological processes in an organism. Sleep-wake cycle is a basic and determinative element of circadian rhythm in humans (1). It has been shown that circadian rhythm effects physiological conditions (2). The relationship between circadian rhythm, sleep-wake cycle and health conditions such as mood disorders were demonstrated in various studies (3-6). However, in literature, there are contradictory results regarding the relationship between physical activity and circadian preferences, as several studies did not reveal any effect of circadian rhythm to physical activity (7, 8).

Due to contradictory results from existing studies, this study was planned to further investigate the effect of circadian preferences on physical activity levels. Thus, in this study, it is aimed to analyze the relationship between physical activity and circadian preferences in medical students of Trakya University School of Medicine. To the best of our knowledge, there are no studies investigating this relationship in medical students.

MATERIAL AND METHODS

This cross-sectional survey study was approved by Scientific Research Ethics Committee of Trakya University School of Medicine. The research was carried out between April and May 2017 involving 1st to 5th grade students of Trakya University School of Medicine. Participants who reported any physical or mental illness were not included in the study.

Adress for Correspondence: Çağrı Girit, Trakya University School of Medicine, Edirne, TURKEY - e-mail: cagrigirit@hotmail.com

The groups were determined as morning-type, intermediate-type and evening-type by using Horne & Östberg's Scale to find out their circadian rhythm characteristics in terms of chronotypes (9). Participants who have 16-41 morningness-eveningness score were accepted as evening-type, scores of 42-58 as intermediate-type, scores of 59-86 as morning-type.

Two types of International Physical Activity Questionnaire (IPAQ) forms are used to evaluate physical activity levels: IPAQ short form and IPAQ long form. In our study, IPAQ short form was used to determine physical activity levels of participants (10). Participants with less than 600 points were accepted as inactive, between 600 and 3000 were minimal active and more than 3000 were accepted as physically active.

Demographic and anthropometric values including gender, age and Body Mass Index (BMI) of participants were also determined by questionnaires. All questionnaires were filled out by the participants under the researcher's surveillance. The questionnaires were collected right after they were completed for evaluation. Surveys with missing data were excluded from the study. After recording the data, statistical analysis was performed.

As for statistical analysis, Pearson Chi-Square test and Kruskal-Wallis test were used to evaluate the categorical data. Numbers, percentages, mean ± standard deviation were used as descriptive statistics. A p value of <0.05 was set for statistical significance.

RESULTS

The study included 351 students of Trakya University School of Medicine, 27 were excluded due to missing data and 29 due to health conditions. Out of all participants, 208 were female and 143 of them were male. The mean age of the study group was 20.79 ± 1.94 years. The mean age of female participants was 20.69 ± 1.84 years and of male participants was 20.95 ± 2.08 years. The mean value of BMI was 22.33 kg/m^2.

There was no statistically significant difference regarding the demographic data among the chronotype groups (p= 0.858 for age and p=0.788 for BMI). The mean value of the Horne & Östberg's score for morning-type was 62.25 ± 4.02, intermediate-type was 49.52 ± 4.48, and evening-type was 36.26 ± 3.68. There were 32 (9.11%) morning-type, 234 (66.6%) intermediate-type and 85 (24.21%) evening-type volunteers. Among all morning-type volunteers, 22 (68.75%) of them were female and 10 (31.25%) were male morning-type, while among intermediate-type participants 146 (70.19%) were female and 88 (29.81%) were male intermediate-type. Also out of all evening-type subjects, 40 (47.15%) of them were female and 45 (52.85%) were male evening-type.

In this study, the groups were compared regarding their physical activity scores based on IPAQ classification. Of the morning-type volunteers, 4 (12.5%) were inactive, 19 (59.4%) were minimal active and 9 (28.1%) were found as physically active. Of the intermediate-type volunteers 74 (31.6%) were inactive, 116 (49.6%) were minimal active and 44 (18.8%) were active. Of the evening-type volunteers, 24 (27.9%) were inactive, 42 (48.8%) were minimal active and 20 (23.3%) were active. Considering all study population, 102 (29.0%) were inactive, 177 (50.3%) were minimal active and 73 (20.7%) were active. However, there were no statistically difference between the chronotype groups and the physical activity levels (p=0.222).

Comparison of chronotype preferences and physical activity levels with gender groups brought no statistically significant difference (p>0.05).

The relationship between circadian rhythm and physical activity of subjects was evaluated separately regarding their grades ranging from 1 to 5. No significant difference was shown between circadian rhythm groups in terms of physical activity levels in the 1st grade (p=0.667), 2nd grade (p=0.298), 3rd grade, (p=0.591) and 5th grade (p=0.780) students. There was a significant difference between circadian rhythm groups in terms of physical activity levels in the 4th grade students (p=0.026). The distribution of different chronotype preferences among students from each grade is shown in Table 1.

Table 1: Distribution of chronotype preferences among students from each grade.

Grade	*Chronotype Preference*	*Number*
1	Morning-type	11
	Intermediate-type	79
	Evening-type	41
	Total	131
2	Morning-type	9
	Intermediate-type	53
	Evening-type	7
	Total	69
3	Morning-type	3
	Intermediate-type	42
	Evening-type	18
	Total	63
4	Morning-type	3
	Intermediate-type	20
	Evening-type	5
	Total	28
5	Morning-type	6
	Intermediate-type	40
	Evening-type	15
	Total	61

DISCUSSION

The results of this study showed no correlation between chronotype that were determined with Horne & Östberg's scale and physical activity in healthy young medical students. The subjects were more likely to be intermediate-type. They were mostly minimally active.

The circadian rhythm characteristics of volunteers were classified as morning-type, intermediate-type and evening-type using Horne & Östberg's scale (9). Every movement that is done by using skeletal muscles and requires energy is described as physical activity (11). Physical activity is associated with whole body system. IPAQ can be used to evaluate physical activity as in our study (10). Likus et al. (12) found that even though future healthcare professionals are aware of the importance of physical activity, they do not prefer doing physical activity regularly. Besides, Stanford et al. (13) found that physicians and medical students do more physical activity compared to the general population. Results from studies concerning this topic were contradictory, and review of the literature did not locate any studies specifically involving medical students. The mean age of the study population as 20.79 ± 1.94 pointed out that the population consists of young volunteers and this population has homogenous demographic data.

The analysis did not reveal any statistically significant relationship between physical activity and chronotypes (p=0.222). Similarly, a separate assessment regarding the grades of students did not reveal any statistically significant relationship with an exception for the 4th grade students (p=0.026). Since there were only 28 participants from the 4th grade, further studies are needed to be performed with a greater population. Evaluation methods for physical activity might be changed and physical activity monitoring like acti-graph can be used instead of questionnaires.

The relationship between chronotype and physical activity has been investigated in several studies. Vardar et al. (2) and Schall et al. (3) found that morning-type students are more active than the others. Wennman et al. (4) showed in their study that evening-type people are less physically active and are more likely to live a sedentary life compared to the morning-types. It is also shown that there is a positive correlation between chronotype score and free time physical activity (5). Schaal et al. (3) found out that physical activity levels are higher in morning-type German adolescents. Similarly, the study results of Haraszti et al. (6), Vitale et al. (14), Schaal et al. (3) and Urban R et al. (15) showed a correlation. Haraszti et al. (6) found that working-women who are prone to morningness have higher physical activity levels. Moreover, Urban R et al. (15) described eveningness as a risk factor for physical inactivity. In contrast to these findings, Laborde et al. (7) and Whitlier et al. (8) did not find any statistical correlation between physical activity and circadian rhythm, which is consistent with the findings of our study.

In conclusion, the results of this study showed no relationship between physical activity and circadian types in healthy young medical students. Thus, endogenous control of circadian rhythms may not be accepted as an important factor for daily physical activity in medical students.

Ethics Committee Approval: This study was approved by Scientific Researches Committee of Trakya University School of Medicine.
Informed Consent: Written informed consent was obtained from the participants of this study.
Conflict of Interest: The authors declared no conflict of interest.
Author contributions: Concept: ÇG, OA, ŞK, NS, SAV. Design: ÇG, OA, ŞK, NS, SAV. Supervision: ÇG, OA, ŞK, NS, SAV. Resources: ÇG, OA, ŞK, NS, SAV. Materials: ÇG, OA, ŞK, NS, SAV. Data collection and/or processing: ÇG, OA, ŞK, NS, SAV. Analysis and/or Interpretation: ÇG, OA, ŞK, NS, SAV. Literature Search: ÇG, OA, ŞK, NS, SAV. Writing Manuscript: ÇG, OA, ŞK, NS, SAV. Critical Review: ÇG, OA, ŞK, NS, SAV.
Financial disclosure: The authors declared that this study received no financial support.
Editor-in-chief's Note: One of the authors of this article, Çağrı Girit is member of the editorial board of Turkish Medical Student Journal. However, she did not take place in any stage on the editorial decision of the manuscript. The editors who evaluated this manuscript are from another institutions.

REFERENCES

1. Akıncı E, Orhan Ö. Sirkadiyen ritim uyku bozuklukları. Psikiyatride Güncel Yaklaşımlar 2016;8:178.

2. Vardar E, Vardar A, Molla T et al. Psychological symptoms and sleep quality in young subjects with different circadian preferences. Biological Rhythm Research 2008;39:493-500.

3. Schaal S, Peter M, Randlerc C. Morningness-eveningness and physical activity in adolescents. Int J Sport Exercise Psychol 2010;8:147–59.

4. Wennman H, Kronholm E, Partonen T et al. Evening typology and morning tiredness associates with low leisure time physical activity and high sitting. Chronobiol Int 2015;32:1090–100.

5. Culnan E, Kloss JD, Grandner M. A prospective study of weight gain associated with chronotype among college freshmen. Chronobiol Int 2013;30:682–90.

6. Haraszti RA, Purebl G, Salavecz G et al. Morningness-eveningness interferes with perceived health, physical activity, diet and stress levels in working women: a cross-sectional study. Chronobiol Int 2014;31:829–37.

7. Laborde S, Guillén F, Dosseville F et al. Chronotype, sport participation, and positive personality-trait-like individual differences. Chronobiol Int 2015;32(7):942-51.

8. Whittier A, Sanchez S, Castañeda B et al. Eveningness chronotype, daytime sleepiness, caffeine consumption, and use of other stimulants among Peruvian University students. J Caffeine Res 2014;4:21-7.

9. Horne JA, Ostberg O. A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. Int J Chronobiol 1976;4:97–110.

10. Karaca A, Ergen E, Koruç Z. Fiziksel aktivite değerlendirme anketi (FADA) güvenirlik ve geçerlik çalışması. Spor Bilimleri Dergisi 2000;23:17-28.

11. 2018 Physical Activity Guidelines Advisory Committee. 2018 Physical Activity Guidelines Advisory Committee scientific report. Washington (DC) Dept. of Health and Human Services (US). Office of the Assistant Secretary for Health: 2018.

12. Likus W, Milka D, Bajor G et al. Dietary habits and physical activity in students from the Medical University of Silesia in Poland. Rocz Panstw Zakl Hig 2013;64(4):317-24.

13. Stanford FC, Durkin MW, Stallworth JR et al. Comparison of physical activity levels in physicians and medical students with the general adult population of the United States. Phys Sportsmed 2013;41(4):86-92.

14. Vitale JA, Weydahl A. Chronotype, physical activity, and sport performance: a systematic review. Sports Med 2017;47(9):1859-68.

15. Urbán R, Magyaródi T, Rigó A. Morningness-eveningness, chronotypes and health-impairing behaviors in adolescents. Chronobiol Int 2011;28(3):238-47.