

Morningness/eveningness chronobiological assessment of Dental students: chronotype

Avaliação de matutividade/vespertinidade dos estudantes de Odontologia: cronótipo

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ABSTRACT

Background and objective: Considering that chronotype is an individual differential characteristic reflecting the time of day when individuals have their best performances, some people prefer to wake up early in the morning and are more alert in the first part of the day, others prefer to wake up later, as their peak time of the day is in the evening, and they prefer to go to bed late at night. The purpose of this study was to analyze the chronotype of undergraduate dental students and to identify the relationship between chronotype and periods of both physical activity and study, as well as to verify the correlation to age. **Methods:** Seventy-five first-year students, who participated voluntarily in the study, both genders, whose mean age was 19 years old (± 1.5), answered the Horne and Ostberg Questionnaire (1976), which was modified and validated by Benedito-Silva et al. for Brazilian population and was applied at the Dental School of the University of São Paulo, Ribeirão Preto (USP). **Results:** The results revealed a predominance of "Indifferent" chronotype, followed by "Moderately eveningness", "Moderately morningness" and "Definitely eveningness" chronotypes. A significant statistical correlation was not observed between chronotypes and individual characteristics. **Conclusions:** There was a predominance of indifferent chronotype among dental students and we did not find any correlation between chronotype, time of study, physical activity, gender and age.

Keywords: Circadian rhythm; Exercise; Students, dental

RESUMO

Introdução e objetivo: Considerando-se que o cronótipo é uma característica individual que reflete o período do dia em que os indivíduos tem o seu melhor desempenho, algumas pessoas preferem acordar cedo e estão mais alertas nas primeiras horas da manhã, enquanto outras preferem acordar mais tarde, pois seu pico de desempenho é vespertino e elas preferem ir para a cama tarde da noite. A proposta deste estudo foi analisar o cronótipo de estudantes de

odontologia e identificar a relação entre cronótipo, período de atividade física e de estudo, como também verificar a correlação com idade. **Métodos:** Participaram 75 estudantes voluntários do primeiro ano do curso de Odontologia, de ambos os sexos, com média de idade de 19 anos ($\pm 1,5$). Responderam ao questionário de Horne & Ostberg (1976) modificado e validado por Benedito-Silva et al. para a população brasileira. **Resultados:** Os resultados mostraram a predominância do "cronótipo indiferente", seguido pelo "moderadamente vespertino", "moderadamente matutino" e "definitivamente vespertino". Não foi verificada correlação significativa entre o cronótipo e as características individuais dos sujeitos. **Conclusão:** Houve uma predominância do cronótipo indiferente entre estudantes de odontologia e não foi encontrada correlação entre cronótipo, tempo de estudo, atividade física, sexo e idade.

Descritores: Ritmo circadiano; Exercício; Estudantes de Odontologia

INTRODUCTION

Chronobiology is a branch of science that studies biological rhythms in living organisms and systematizes this knowledge. It may be defined as "a study of mechanisms and alterations of each organism's temporal structure under various situations" ⁽¹⁾. From this point of view, time is seen as "a fundamental dimension of living structures" ⁽²⁾.

Biological rhythms are endogenous and cannot be manipulated by the subject. A person who studies at schedule times that conflict with his/her biological rhythm may pay a price in terms of health, quality of life and performance ⁽³⁾.

An individual's chronotype, with morningness/eveningness characteristics, is important to determine periods of best performances and well-being. This information can be used to optimize the quality of study and to minimize any associated disturbance.

Study carried out at Dental School of the Universidade de São Paulo – USP, Ribeirão Preto (SP), Brazil.

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According to Horne and Ostberg⁽⁴⁾, individuals may be classified into three chronotypes, taking into account individual differences in temporal allocation of biological rhythms. The chronotypes are the following: morningness (subdivided into extreme and moderate), eveningness (subdivided into extreme and moderate) and indifferent. Morningness individuals are those who prefer going to bed early (around 22 or 23h) and consequently get up early (around 6h) without any difficulty, resulting in good physical and mental performances. Eveningness individuals, on the other hand, go to bed late (around 1h) and consequently wake up late (around 10h), presenting better performance in the afternoon and in the beginning of the evening. The indifferent chronotypes, however, are more flexible and choose intermediary times according to their routine needs⁽⁵⁾.

Zubioli⁽⁶⁾ studied the chronotypes of nursing assistants who work in a hospital in the State of Parana and observed that individual characteristics are not always respected when placing workers to the different shifts. For example, the morning shift may be tiring for workers who have eveningness chronotype due to the fact that it demands that they wake up earlier than it is adequate for their organism.

Campos and De Martino⁽⁷⁾ verified the chronotype of a group of nursing professors. They concluded that individual preferences were in accordance to work regimen of the study population who had chosen the work period according to their chronotypes.

Studies on circadian rhythm of the sleep-wake cycle revealed that nurses who worked on night shifts had a peculiar characteristic regarding sleep duration. The data showed that individuals who worked during the night slept up to 14 hours soon after their work shift, suggesting the need to replace hours of sleeping more than the number of hours that were in fact lost. Some of these nurses presented characteristics that did not correspond with their best ability, which suggests that their chronotypes should be analyzed⁽⁸⁾.

Zavada et al.⁽⁹⁾ performed a comparative study using two questionnaires: Munich Chronotype Questionnaire (MEQ) and Horne–Ostberg (HO). Time of mid-sleep on free days and on workdays was assessed using MEQ. It was concluded that MEQ was more strongly correlated to midpoint of sleeping on free days. Sleep onset was correlated to MEQ score and it was usually slightly better than sleep-end times, especially on workdays. It was also observed that mid-sleep on free days is a good predictor of chronotype (as judged by sleep preferences).

In this study, the individual characteristics and chronotypes of dental university students were analyzed in order to suggest more adequate hours for their academic performance and to contribute to an improvement on their quality of life, in harmony with their biological rhythms.

OBJECTIVES

The purpose of this study was to analyze the chronotype of undergraduate dental students and to identify the relationship between chronotype and periods of both physical activity and study, as well as correlation to age.

METHODS

Subjects

First-term dental university students from Universidade de São Paulo (Ribeirão Preto, Brazil) were invited to participate in this study. From a total of 100 students, some were absent at the time of the class on the day of the research and others refused to participate. Seventy-five students took part voluntarily in the research and signed the informed consent term. The study was approved by the Ethics Research Committee from Universidade de São Paulo, Brazil.

Data collection instruments

Horne and Ostberg⁽⁴⁾ Questionnaire (HO) with a Portuguese version, adapted and validated by Benedito-Silva et al.⁽¹⁰⁾ was employed. These authors applied the questionnaire on several different areas of Brazil, adapting the score according to habits and characteristics of the Brazilian population. The questionnaire consists of questions about habitual situations of daily life and the individuals should register their favorite time periods for each activity.

The questionnaire results were shown in a numeric score between 16 and 86, according to which the individual could be classified into five chronotypes: eveningness (16 to 30), moderately eveningness (31 to 41), indifferent (42 to 58), moderately morningness (59 to 69) and extreme morningness (70 to 86). The students also answered to items regarding social-demographic data (gender, age, nationality, level of physical activities and hours of study).

Procedures

Data were collected in the classroom before classes began and the subjects were asked to answer the questionnaire and to return it when it was finished.

Data analysis

Tables and graphs were used to organize the data in absolute numbers and percentages and to submit to a descriptive statistics analysis. Chronotype classification was performed using a program developed by De Martino and Pirola*. A non-parametric test was used to verify the correlation between the score of the HO questionnaire and age (Spearman's rank correlation) for all subjects. Kruskal-Wallis test⁽¹¹⁾ was used

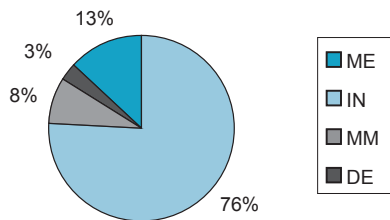
* De Martino MME, Pirola D. Software sobre questionário de identificação de indivíduos matutinos e vespertinos. Programa datilografado, 1999.

to score the physical activity and study times, as well as to compare the HO score to age.

RESULTS

The students' ages ranged from 17 to 27 years old, mean age of 19 (± 1.5) years. The mean age of females was 18.9 (± 1.2) years, while the mean age of males was 19.1 (± 1.7) years.

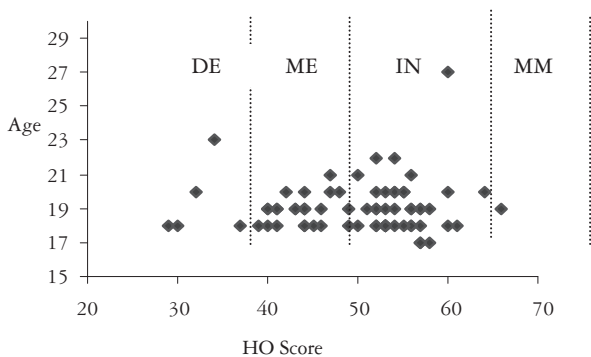
The "indifferent" chronotype was found to be predominant (IN, 76%), followed by the "moderately evening" (ME, 13%), "moderately morning" (MM, 8%) and "definitely evening" (DE, 3%), as shown in Figure 1.



DE: definitely evening; ME: moderate evening; IN: indifferent; MM: moderately morning

Figure 1: Distribution of 75 students classified according to chronotype.

The score obtained by the participants ranged from 29 to 66. No significant statistical correlation was observed between the age of the students and the score obtained in the HO questionnaire (Spearman $R=0.0271$), as shown in Figure 2.



DE: definitely evening; ME: moderate evening; IN: indifferent; MM: moderately morning

Figure 2: Distribution of subjects according to the HO questionnaire score and age.

No correlation was also observed between the HO questionnaire score and age of subjects according to gender, as observed in Figure 3.

An analysis of the physical activities practiced by the students showed that 41.9% of all students performed different categories of physical exercises, as demonstrated by figure 4. Body building was observed to be the most frequent

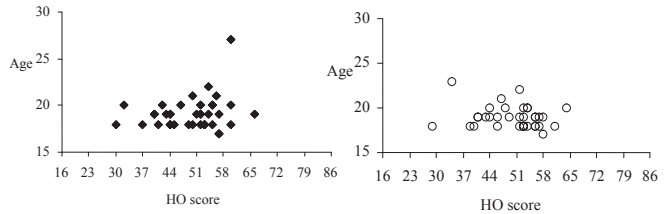


Figure 3: Distribution of subjects according to the HO score for age and gender, dark spots for male and vacant circles for female.

physical activity performed, followed by gymnastics, soccer, volleyball and walking. Other categories such as basketball, tennis and swimming were cited only once (Figure 4).

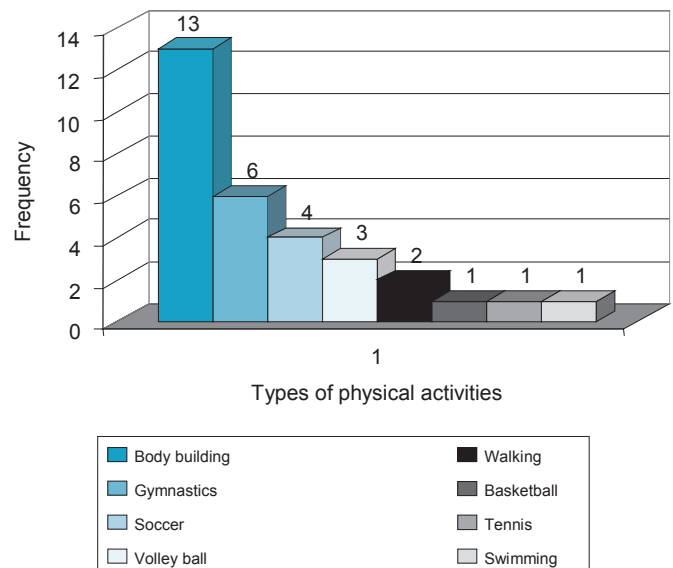


Figure 4: Frequency of physical activities performed by the university students.

No correlation was observed between the time of the day in which the physical activity was practiced and the score obtained in the HO questionnaire (Spearman's $R=0.2101$). It should be observed that only 22 students informed the time when physical activity was performed. Most of these activities probably took place in the evenings, since the dental course is full-time and evenings are the only time available. It is interesting to note that 33% of the morningness chronotype students referred practicing physical activities while 42% of the eveningness chronotype and 44% of the indifferent type answered positively.

It was also verified that regarding time of study, the subjects reported that they studied an average of four hours per day, at least two hours, a question answered by 53 students. No correlation was observed between the time of study and the HO questionnaire score (Spearman $R=0.1051$). It was verified that 33% of the morningness chronotype, 75% of the eveningness chronotype (moderate and definitely) and

74% of the indifferent participants indicated their time of study.

DISCUSSION

Another study on the chronotype of undergraduate nursing students⁽³⁾ revealed the predominance of the indifferent, followed by the moderate morningness. It is well known that eveningness is an inherent characteristic of younger individuals who demonstrate it as they reach adolescence. The fact that the subjects were full-time, and also their ages were homogenous, may have contributed to the inexistence of statistical significant differences in this study.

Recently, another study⁽¹²⁾ described the prepubertal children's chronotypes in order to examine the validity between children's chronotype measures and sleep-wake cycles, as well as to assess the associations between these measures. In this study, the authors used actigraphy to assess the children's sleep and also the sleeping diaries reported by the children's parents. The authors concluded that using the measures CCTQ (MSF, M/E and CT) it is possible to evaluate the chronotype in prepubertal children between 4 and 11 years old.

We concluded that among the researched students, there has been the predominance of "Indifferent" chronotype, followed by "Moderately Eveningness", "Moderately Morningness" and "Definitely Eveningness" chronotypes.

The students alternated study periods with physical activities that were practiced in the evenings by 41.89% of the subjects. Time of study as well as physical activity did not show any relationship with the HO questionnaire score.

No significant statistical correlation was verified between the chronotype score obtained in the HO questionnaire with regard to gender and age.

It is suggested that more longitudinal studies, that accompany the students during their entire course, as well as cross-sectional studies that compare students who are in different years of the course should be done, as performed by De Martino and Ling⁽³⁾.

There was a predominance of indifferent chronotype among these students and we did not find any correlation between chronotype, time of study, physical activity, gender and age.

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