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Association between Quality of life, Sleepiness, Fatigue, and Anthropometric Parameters in young University Students

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ABSTRACT

Cardiovascular risks are now an epidemiological reality among adults and teenagers. This scenario leads to impairments in quality of life and represents a burden in healthcare and government costs. This study aimed to evaluate the association between risk factors for cardiovascular diseases, quality of life, daytime sleepiness, fatigue, and anthropometric parameters on university students in Fortaleza/CE, Brazil. It was a descriptive, crossectional, correlational study, made through epidemiological assessment in young university students, with primary data and quantitative analysis. The results showed a negative influence of daytime sleepiness and fatigue on the overall quality of life. Functional capacity, a component of the quality of life, which represents the ability to perform tasks and activities in their life, and limitations due to emotional aspects could impact a person's well-being and health. Moreover, excessive daytime sleepiness showed a strong correlation with almost all domains of quality of life. It was found that although volunteers did not show a low quality of life, fatigue levels and sleepiness presented as relevant variables. There is a need to comprehend and control these variables to promote students' health and, consequently, to live healthier adulthood.

KEYWORDS: sleepiness; fatigue; quality of life; anthropometry; young adults; university.

INTRODUCTION

In Brazil, cardiovascular diseases (CVD) accounts for 30% of deaths and are the leading cause of deaths worldwide (Rocha & Martins, 2017). Furthermore, risk factors such as dyslipidemia, smoking, and obesity, known as non-communicable chronic diseases (NCCD), are responsible for 71% of deaths worldwide, ranging from 37% in low-income countries, to 88% in developed countries (Organização Pan-Americana de Saúde, 2018). It has been established a correlation between the development of CVD and NCCD, particularly obesity with central fat distribution (Lima, 2018; Mendonça, 2016; Oliveira et al., 2010).

Though these cardiovascular risks were considered significant only in older adults and elderly, but recent studies demonstrated that these risks also affect young adults (Carvalho et al., 2015; Dantas et al., 2015; Dwyer et al., 2009; George et al., 2017; Yano et al., 2016; Zeller & Modi, 2006). This epidemiological scenario not only implies a significant reduction in life quality but also represents a burden to society in health care costs (Rocha & Martins, 2017).

The risk of death in obese adults who were also obese during childhood is significantly higher than eutrophic adults, which presented normal weight during childhood. The quality of life and psychological well-being is improved as a consequence of weight loss (Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica, 2016). Together, these data points that obesity is associated with low-grade chronic inflammation (Ying et al., 2019). In addition,

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islet macrophages also impair the insulin secretory capacity of β-cells, comprising the quality of life (Ying et al., 2019). Other dysfunctions associated with obesity are sleeping disorders. Studies associate a higher prevalence of sleepiness with main components of Metabolic Syndrome and CVD (Mansur et al., 2015; Polido-Arjona et al., 2018; Rawat et al., 2019;). However, weight loss has been shown to attenuate sleeping disorders' severity (Patel & Mehra, 2015).

For children and adults, the number of night sleeping hours is conversely associated with Body Mass Index (BMI) and obesity in cross-sectional studies and obesity incidence in longitudinal studies. These changes are consistent with chronic sleeping deprivation, leading to increases in obesity risk and the propensity to inflammatory disorders (ABESO, 2016; Pereira et al., 2020).

Consequently, evidence points towards an increased manifestation of fatigue associated with sleeping deprivation and obesity in young university students and correlated with years of study and BMI (Amaducci et al., 2010; Hershner & Chervin, 2014; Maugeri et al., 2018).

Although the number of studies with university students is limited, those who previously assessed these parameters showed fatigue, which might impact learning, quality of life, and professional graduation. Studies regarding stress in undergraduate students demonstrated psychological stress, sleeping disorders, and other physically expressed symptoms (Li & Hasson, 2020; Núñez et al., 2019; Whittier et al., 2014).

Therefore, this study aimed to assess and associate risk factors of CVD, quality of life, daylight sleepiness, fatigue, and anthropometric parameters in a sample of university students in Fortaleza/CE, Brazil.

METHODS

This observational, analytical cross-sectional study was made through an epidemiological assessment of university students, and simple random sampling was used.

Participant consent and recruitment

Participants were recruited from the general population through flyer advertisements and advertisements on the Centro Universitário Fanor|Wyden. The data were acquired during the second semester of 2018. The present study intended to focus on the age range of students who are mostly present at university centers. The research team subsequently phoned the parents of the identified children to verify their interest and to check that their children fulfilled the inclusion criteria: (a) Aged between 18 to 30 years; (b) absence of chronic medical problems, such as epilepsy and asthma; (c) able to perform the tests, and (d) accept to participate in the study voluntarily. After written consent, three trained researchers conduct all protocols.

Initially, 98 students opted to participate, and eight did not participate in the experiment (due to illness or forgetting the appointment). For this sample, 90 young university students were randomly chosen, composed of 23 males (25,6%) and 67 females (74,4%). The research protocol was approved by the Human Research Ethics Committee of UniFAMETRO University under the protocol 2.089.272 and CAAE: 65185717.8.0000.5618. All participants voluntarily signed the term of consent for this research.

Study design and measures

Study design

Individual appointments took place between 7 am, and 9 am at the Centro Universitário Fanor|Wyden. On arrival, a physical examination was performed. Then the students completed a questionnaire in a separate room and were left alone with the research team for the rest of the study. The volunteers completed self-report questionnaires when necessary, with the help of the investigating group.

Instruments

BMI was assessed through height and weight with a measuring tape with 1mm accuracy and a digital scale (Plenna®), respectively. Hip Circumference (HC), Waist-to-Hip Ratio (WHR), and Neck circumference (NC) were measured using an anthropometric tape made of glass fiber and with 200cm of length. Measurements were made accordingly to the Anthropometric Standardization Reference Manual guidelines (Lohman et al., 1988). All measurements were made twice, and a mean between results was established. A third measurement was made, and the values that lead to differences were discarded in case of discrepancy between the first and the second measurements.

To assess physical activity levels, it was used the short version of the International Physical Activity Questionnaire (IPAQ), developed by the World Health Organization in 1998 to acquire worldwide data regarding physical activity. IPAQ has been previously used to assess university students' physical activity levels in Brazil and other countries (Fagaras et al., 2015; Melo et al., 2016;). IPAQ questionnaire classifies the respondents as follows: Sedentary, irregularly active, active, and very active considering the amount of time spent doing physical activity weekly, frequency, and intensity (Matsudo et al., 2001).

It was used the Sleepiness scale EPWORTH (ESE) to evaluate daytime sleepiness. The ESE is a questionnaire that reports the probabilities of sleep in eight situations involving daily activities. The global score ranges from 0 to 24 points. Scores above 10 indicated excessive diurnal sleepiness (Bertolazi et al., 2009).

The Fatigue Severity Scale (FSS) was used to analyze fatigue symptoms. It contains nine affirmative sentences where participants sign a score ranging from 1 to 7 regarding how that affirmative fits his present condition. Number 1 implies that the participant strongly disagrees with the affirmative, and seven implies that he strongly agrees. Total score ranges from 9 to 63, in which scores above 28 are indicatives of fatigue.

Procedures

For this study, inclusion criteria were: to be aged 18 years or more, been regularly registered to a university course, and do not present any kind of condition that limits anthropometric data collection. Recruitment of volunteers was made by advertising the study in classrooms and other locations of the university

Anthropometric assessment and questionnaire application were madmade by professionals. Initially, body weight and height, waist, hip, and neck circumference were measured. Then, participants answered the questionnaires regarding physical activity levels, daytime sleepiness, and fatigue.

Statistical Analysis

Data were expressed as mean, standard deviation, and percentage values. It was used Kolmogorov-Smirnov to assess residual normality, and the Levene test to verify the homogeneity of variances. Fisher's test was used for comparisons between categorical variables in this study. Yates' correction test was used to compare genders. ANOVA was used for data with normal distribution and homogeneity of variances and Kruskall-Wallis test to non-parametric variables to compare more than two groups. Student's T-test or Mann-Whitney test were used to compare two groups. Multiple linear regression was also used in this study. The significance level was determined as 95%. Data were plotted and analyzed in statistical software SPSS® for Windows (SPSS21).

RESULTS

Clinical and demographical characteristics

In the present study, students BMI ranged from 16.8 to 39.0 (23.2±4.1) kg/m². Our data showed that waist circumference values varied from 64.0 to 105.0 (77.0±10.1) cm while waist-hip ratio ranged from 0.65 to 1.27 (0.77±0.77). Neck circumference values fluctuated from 29.0 to 42.0 (33.3±3.2) cm. The assessment of students' Daytime Sleepiness demonstrated a mean score of 10.9±4.4. The fatigue symptoms mean score was reported as 28.1±11.2 (Table 1).

Comparison between genders

After a gender analysis, it was found that values for waist circumference in men (84.1±10.3) were higher compared to women (74.7±9.0) (p=0.000), although no differences in BMI were found between genders (p=0.52). Similar results were found for WHR (0.83±0.1 vs. 0.74±0.05. p=0.000) and NC (38.5±2.1 vs. 33.0±2.2. p=0.000). Regarding physical activity levels, no differences were found between genders (p=0.99). In addition, no significant correlations were found between genders and daytime sleep (P=0.74) and fatigue (p=0.96) (Table 2).

Table 1. Anthropometric, daytime sleepiness and fatigue data gathered from young university students.

Variables	Mean	Standard Deviation
Daytime sleepiness	10.9	4.4
Fatigue symptoms	28.1	11.2
Anthropometric measures		
BMI	23.2	4.1
WC	77.0	10.1
WHR	0.77	0.07
NC	34.3	3.2

Notes: WC: Waist Circumference (cm), NC: Neck Circumference (cm), BMI: Body Mass Index (kg/m²), WHR: Waist Hip Ratio.

Table 2. Comparison of Anthropometric and physical activity levels between genders.

Variables	Male N=23(25.6%)	Female N=67(74.4%)	p value
Anthropometric values			
BMI (Kg/m²). (Mean±SD)	23.7(±3.6)	23.1(±4.3)	0.52
WC (cm)	84.1(±10.3)	74.7(±9.0)	0.000**
WHR (Mean±SD)	0.83(±0.1)	0.74(±0.05)	0.000**
NC (Mean±SD)	38.5(±2.1)	33.0(±2.2)	0.000**
Physical activity levels	IPAQ. n. (%)		
Sedentary	3(14.3%)	8(12.9%)	0.99
Irregularly active	6(28.6%)	19(30.6%)	
Active	6(28.6%)	18(29%)	
Very active	6(28.6%)	17(27.4%)	

Notes: WC: Waist Circumference (cm), NC: Neck Circumference (cm), BMI: Body Mass Index (kg/m²), N: number of subjects, WHR: Waist-Hip Ratio.

Correlation between physical activity, quality of life, and fatigue symptoms

In the present study, physical activity levels did not influence sub-items of quality of life, excessive daytime sleepiness, or fatigue symptoms.

Linear regression between daytime sleepiness and quality of life domains demonstrated that Excessive daytime sleepiness was negatively correlated with Functional capacity (p=0.01. r=-.25), General health (p=0.001. r=-.35), vitality (p=0.004. r=-.30), social aspects (p=0.008. r=-.27), limitations due to emotional aspects (p=0.02. r=-.24) and mental health (p=0.000. r=-.36). Limitations due to physical aspects and pain were not correlated with excessive daytime sleepiness (Table 3).

Linear regression results from fatigue and quality of life showed a negative correlation between fatigue score and "Limitations due to emotional aspects" domain (Table 4). Fatigue was not correlated with any other quality of life domain.

DISCUSSION

The main results of this study indicate a negative influence of daytime sleepiness and fatigue on quality of life. These data show that functional capacity, a component of life quality representing the ability to perform tasks and activities in their life, and limitations due to emotional aspects could impact a person's well-being and health. Furthermore, excessive daytime sleepiness demonstrates a strong negative association with almost all domains in the quality of life questionnaire.

Daytime sleepiness and poor sleep quality could be related to alterations in the biological clock and circadian cycle. The suprachiasmatic nucleus may present alterations and abnormal function, which could lead to changes in serum glucose, cortisol, and blood pressure (Froy, 2011; Kreier et al., 2007). The effects of daytime sleepiness are related to glucose metabolism. Studies have shown that autonomic dysfunction is associated with an increased risk of developing diabetes in young and elderly (Stamatakis & Punjabi, 2010).

To date, there is no consensus regarding the duration and intensity of daily physical activity to reduce excessive daytime sleepiness in patients with type 2 diabetes. However, it is well established that more time of planned physical activity is associated with benefits due to improvements in psychological and psychosocial interactions. Thus, physical activity may intervene positively in mood and sociability, which might reduce sleepiness symptoms (Okay et al., 2009).

In the present study, physical activity levels were not sufficient to interfere with analyzed variables. However, it could be hypothesized that increasing health habits and physical activity levels would be more efficient in the quality of life of young university students. Effting et al. (2019) reported relevant data regarding resistance exercise as a tool to treat obesity and being also important to manage metabolic alterations and to maintain quality of life.

Although we were unable to find alterations in anthropometric measures, it is well known that obesity impacts quality of life. Low Cardiorespiratory fitness seems to affect cardiovascular risk factors in teenagers negatively, a stage in life which antecedes university entry, especially regarding excessive weight in both genders and biochemical profile in male, thus, urging for preemptive actions during childhood and teenagehood (Rodrigues et al., 2007).

There are reports from cases which hypertension (Carvalho et al., 2013), obesity (Poeta et al., 2010), CVD prevalence (Teston et al., 2016), demographic and social economic factors related to health and lifestyle (Ascef et al., 2017) negatively affected the quality of life in these patients.

Table 4. Linear regression between fatigue and quality of life.

			Coefficient	t	p-value
	B	SD	Beta		
(Constant)	35.016	6.443		5.434	.000
FC	-.029	.078	-.050	-.369	0.71
LPA	-.001	.044	-.003	-.023	0.93
PN	-.099	.072	-.180	-1.365	0.13
GH	-.055	.077	-.116	-.716	0.42
VIT	.053	.098	.094	.544	0.51
SA	.102	.078	.210	1.313	0.19
LEA	-.080	.040	-.276	-2.029	0.04*
MH	.007	.119	.011	.058	0.95

Notes: FC – Functional capacity; LPA – Limitations due physical aspects; GH – General Health; VIT – Vitality; SA – Social Aspects; LEA – Limitations due to emotional aspects; MH – Mental Health; PN – Pain; SD – Standard Deviation.

Table 3. Linear regression between daytime sleepiness and quality of life.

		FC	LPA	PN	GH	VIT	SA	LEA	MH
Daytime sleepiness	Pearson's	-.251	-.203	-.082	-.356**	-.302**	-.278**	-.241*	-.366**
	p value	0.01**	0.05	0.4	0.001**	0.004**	0.008**	0.02**	0.000**

Notes: FC – Functional capacity; LPA – Limitations due physical aspects; GH – General Health; VIT – Vitality; SA – Social Aspects; LEA – Limitations due to emotional aspects; MH – Mental Health; PN – Pain.

These findings corroborate with other factors that impacted the quality of life in other studies, such as concentration, sleep, energy level, ability to perform daily activities, leisure time, and negative emotions (bad mood, despair, anxiety, and depression). These variables are related to the success of the graduation process in performance in academic activities. Although, these factors were not correlated with university evasion, which was practically non-existent in the last decade (Catunda & Ruiz, 2008; Tatjana et al., 2011;).

Domains of quality of life such as: functional capacity, limitations due to emotional aspects, general health, vitality, social aspects, and mental health presented negative correlations with sleepiness. This data supports previous studies (Diaferia et al., 2013; Tassinari et al., 2016). Another interesting finding regards the association of fatigue and the sub-item "limitations due to emotional aspects".

Studies have found symptoms of anxiety, depression, a significant incidence of fatigue, and low physical energy among young adults with sleeping problems (Mill et al., 2010; Muler & Guimarães, 2007). Reports found a prevalence of moderate/intense fatigue in young university students, which, in turn, described moderate/intense impairments in daily activities, showing a positive between fatigue with the graduation year, body mass index, and depression. Academic activities were the main ones responsible for fatigue (Amaducci et al., 2010).

It is expected that young university students to have a better quality of life and health. However, daytime sleepiness and fatigue are variables that might impact both. Moreover, daytime sleepiness and fatigue were also associated with obesity and well-being in young university students (Vgontzas et al., 2006).

It is well established that alterations in the circadian cycle might have genetic influence, but it also might be adjusted by daily circumstances such as work, jet lag, among other situations. A previous study has demonstrated greater sympathetic tonus in subjects with reduced hours of sleep, which may lead to increases in appetite and blood pressure, resulting in obesity and metabolic disorders (Gangwisch, 2009). Thus, a student organization and the work of university students should be well observed.

The findings of this study have important clinical implications. The strengths of the study are the stringent methodological design and clinical evolutions. However, interpretation requires consideration of the methodological limitations of this study procedure, where laboratory analyses could not be conducted. These data should improve our results. Second, the sample size was relatively small, and most students were recruited from the same university, although sample characteristics were comparable to other studies. Future research should aim to replicate findings and investigate the amount and frequency, and quality of sleep, fatigue, and anthropometric parameters on young university students in order to achieve a significant effect. It would also be important to test the effect of physical activity on behaviors in this population.

CONCLUSION

In summary, the levels of physical activity did not influence the sub-items of quality of life, excessive daytime sleepiness, and symptoms of fatigue in university students. However, excessive daytime sleepiness negatively impacts sub-items of quality of life such as functional capacity, general health, vitality, social aspects, limitations due to emotional aspects, and mental health, whereas fatigue only affects the emotional aspects of quality of life. There is a need to understand and control these variables to promote an improvement in the health of college students and, consequently, have a healthier adult life.

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