UNIVERSITY OF TRÁS-OS-MONTES AND ALTO DOURO

PHYSICAL FITNESS AND CARDIOVASCULAR HEALTH IN COLLEGE STUDENTS: A CROSS-SECTIONAL STUDY

DOCTORAL THESIS IN SPORT SCIENCES

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ROSANE DE ALMEIDA ANDRADE

This academic thesis was submitted for obtaining a doctoral degree in Sports Sciences according to the provisions of Portuguese Decree-Law 107/2008 of June 25th.

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Dedicated to my mother Marisete Almeida (In memory), my father and my daughters Teresa and Mariane.

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Works submitted for publication:

Andrade, R. de A.; Menezes, B. A. de; Bastos, D. M.; Daniele, T. M. C., Sousa, N. J. F. de. Cardiovascular Disease Risk Factors Prevalence among Young College Students. **Motricidade**.

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List of Abbreviations

AAHPERD	Health Related Fitness Battery
ABS	Abdominal
ACSM	American College Of Sports Medicine
AIDS	Acquired Immunodeficiency Syndrome
ALS	Amyotrophic Lateral Sclerosis
ANOVA	Analysis Of Variance
AP	Arterial Pressure
BASOMS	Brazilian Association For The Study Of Obesity And Metabolic Syndrome
BC	Body Composition
BMI	Body Mass Index
CM	Centimeter
CND	Noncommunicable Chronic Diseases
CRF	Cardiovascular Fitness
CVD	Cardiovascular Diseases
CVR	Cardiovascular Risk
DEXA	Dual-Energy X-Ray Absorptiometry.
DL	Deciliter
DM2	Type 2 Diabetes Mellitus
EDS	Excessive Daytime Sleepiness
FC	Functional Capacity
FLEX	Flexibility
FLEX	Flexibility
FSS	Fatigue Severity Scale
GH	General Health
HB	Healthy Behavior
HB	Healthy Behavior
HC	Hip Circumference
HDL	High Density Lipoprotein
HIV	Human Immunodeficiency Virus
HR	Heart Rate
IPAQ	International Physical Activity Questionnaire

KG	Kilo
LDL	Low Density Lipoprotein
LEA	Limitations Due Emotional Aspects
LPA	Limitations Due Physical Aspects
M^2	Square Meter
MG	Milligram
MH	Mental Health
MS	Metabolic Syndrome
NC	Neck Circumference
PA	Physical Activity
PAHO	Pan-American Health Organization
PF	Physical Fitness
PFRH	Physical Fitness Related To Health
PI	Physical Inactivity
PN	Pain
PRISMA	Preferential Reporting Items For Systematic Reviews And Meta-Analyses Protocol
QL	Quality Of Life
RTI	Research Triangle Institute
SA	Social Aspects
SAP	Systolic Arterial Pressure
SPSS	Statistical Package For The Social Sciences
SSE	Sleepiness Scale Epworth
ST	Sedentary Time
TG	Triglycerides
TSH	Thyroid Stimulating Hormone
UNIFAMETRO	Fametro University Center
UNIFANOR	Unifanor Wyden University Center
VIT	Vitality
VO_{2max}	Maximum Oxygen Volume
WC	Waist Circumference
WHO	World Health Organization
WHR	Waist-Hip Ratio

Abstract

The general objective of this study was to investigate the effects of physical fitness on cardiovascular risk and the perception of quality of life and health levels in young college students. Three studies have been developed since 2015-2019. The first study is a systematic review to understand the state of the art, analyzing the association of physical fitness with risk factors for cardiovascular disease in young college students. The searches were performed in the MIDELINE databases with the descriptors: "physical fitness" and "cardiovascular risk" associated with the words "students" and "university". Articles published from 2007 to 2017 of observational epidemiological type in the English language were included. Four cross-sectional quantitative studies were selected according to specific eligibility criteria according to the preferred report items for systematic analysis and meta-analysis protocol. Different authors, including the assessment of risk of study bias and the classification of the strength of evidence, performed data extraction independently. The results showed that young college students have shown a sedentary behavior and low aerobic fitness, with high levels of dyslipidemia, central obesity, also high blood pressure levels, thus characterizing various risk factors for cardiovascular disease. In the second and third study, the sample consisted of 90 young university students, 23 men and 67 women. Univariate and multivariate statistics were performed using the SPSS 21 program. As a result, it was shown that most participants were physically active. Anthropometric variables and systolic blood pressure showed a positive correlation ($p < 0.05$), in contrast, diastolic blood pressure showed no positive correlation ($p > 0.05$). The heart rate test behaved linearly in its correlation with the anthropometric variables ($p < 0.05$). A positive correlation was observed between oximetry and waist-hip ratio ($R = 0.35$; $p = 0.001$). Physical activity levels did not influence the quality of life sub-items, Excessive daytime sleepiness and symptoms of fatigue, as well as comparing in gender the level of physical activity ($p = 0.99$), daytime sleepiness ($p = 0.74$) and fatigue ($p = 0.96$) between gender, there was no statistically significant difference, but in a linear regression it was noticed that excessive daytime sleepiness negatively affected functional capacity ($p = 0.01$, $r = -0.25$), general health ($p = 0.001$, $r = - 0.35$), vitality ($p = 0.004$, $r = -0.30$), social aspects ($p = 0.008$, $r = -0.27$), limitations for emotional aspects ($p = 0.02$, $r = -0.24$) and mental health ($p = 0.000$, $r = -0.36$) analysis of quality of life and fatigue affected emotional aspects ($p = 0.04$) equally in both genders. The body mass index was similar between genders, in waist circumference (84.1 ± 10.3 vs. 74.7 ± 9.0) ($p = 0.000$), waist- hip ratio (0.83

± 0.1 vs. 0.74 ± 0.05, p = 0.000). In addition, neck circumference (38.5 ± 2.1 vs. 33.0 ± 2.2, p = 0.000) men had higher results than women did even though they were more active than women were. The findings of both studies demonstrate that daily physical activity levels are a protective factor against the emergence and development of risks for chronic noncommunicable diseases. One of the most important protective factors to be observed is waist circumference. The results are incipient and attributable to the fact that the sample size is unsatisfactory, suggesting to replicate the same with larger populations in this way about the prevalence of risk factors for chronic noncommunicable diseases in young adults needs further clarification.

***Keywords*:** Cardiovascular risk, young college student, physical fitness, quality of life, sleepiness, anthropometry

Resumo

O objetivo geral deste estudo foi investigar os efeitos da aptidão física no risco cardiovascular e a percepção de qualidade de vida e dos níveis de saúde em jovens universitários. Foram desenvolvidos três estudos desde 2015-2019. O primeiro estudo é uma revisão sistemática com o intuito de compreender o estado da arte, analisando a associação da aptidão física com os fatores de risco para Doenças Cardiovascular em jovens universitários. As buscas foram realizadas nas bases de dados MIDELINE com os descritores: "physical fitness" e "cardiovascular risk" associados às palavras "students" e "university". Foram incluídos os artigos publicados no período de 2007 a 2017, do tipo epidemiológico observacional, na língua, inglesa. Foram selecionados 4 estudos quantitativos transversais de acordo com critérios específicos de elegibilidade de acordo com os itens de relatórios preferenciais para análise sistemática e protocolo de metanálise. A extração de dados foi realizada independentemente por diferentes autores, incluindo a avaliação do risco de viés dos estudos e a classificação da força de evidência. Os resultados mostraram que os jovens universitários tem apresentado um comportamento sedentário e de baixa aptidão aeróbia, com altos ídices de dislípidemias, obesidade central, niveis pressoricos arteriais também altos, caracterizando assim varios fatores de risco de doenças cardiovasculares. No segundo e terceiro estudo a amostra foi composta por 90 jovens universitarios sendo 23 homens e 67 mulheres. A estatistica univariados e multivariados foram realizados no programa SPSS 21. Como resultados, foi demonstrado que a maioria dos participantes eram fisicamente ativos. As variáveis antropométricas e a pressão arterial sistólica demonstraram correlação positiva ($p< 0.05$), em contrapartida, a pressão arterial diastólica não demonstrou correlação positiva ($p> 0.05$). A frequência cardíaca teste se comportou de maneira linear em sua correlação com as variáveis antropométricas ($p< 0.05$). Foi observada uma correlação positiva entre a oximetria e a relação cintura quadril ($R= 0.35$; $p= 0.001$). Os níveis de atividade física não influenciaram os subitens da qualidade de vida, a sonolência excessiva diurna e os sintomas da fadiga, bem como comparando em gêneros o nível de atividade física ($p=0.99$), sonolência diurna ($p=0.74$) e fadiga ($p=0.96$) entre gênero, não houve diferença estatística significativa, porém em uma regressão linear percebeu-se que o sonolência excessiva diurna afetou negativamente a capacidade funcional ($p=0,01$, $r=-0.25$), o estado geral de Saúde ($p=0.001$, $r=- 0.35$), a vitalidade ($p=0.004$, $r=-0.30$), aspectos sociais ($p=0.008$, $r=-0.27$), limitações por

aspectos emocionais (p=0.02, r=-0.24) e saúde mental (p=0.000, r=-0.36) análise da qualidade de vida e a fadiga afetou os aspectos emocionais(p=0.04) de forma igualitária em ambos os gêneros. Quanto ao índice de massa corporal foi similar entre gêneros, já na circunferência da cintura (84.1±10.3 vs. 74.7±9.0) (p=0.000), relação cintura quadril (0.83±0.1 vs. 0.74±0,05, p=0.000) e circunferência do pescoço (38.5±2.1 vs. 33.0±2.2, p=0.000) os homens obtiveram resultados maiores que as mulheres mesmo sendo mais ativos que as mulheres. Os achados dos dois estudos demonstram que os níveis de atividade física diária se apresentam como um fator de proteção contra o surgimento e o desenvolvimento de riscos para doenças crônicas não transmissíveis. Um dos fatores protetivos de grande relevância a ser observado é a circunferência da cintura. Os resultados são incipientes e atribui-se ao fato da quantidade da amostra ser insatisfatória, sugerindo replicar o mesmo com populações maiores dessa forma acerca da prevalência de fatores de risco para doenças crônicas não-transmissíveis em adultos jovens precisa de maiores elucidações.

Descritores: Risco cardiovascular, jovem universitário, aptidão física, qualidade de vida, sonolência, antropometria.

INTRODUCTION

1

Chapter 1: General Introduction

Introduction

The health risks and the young college students physical fitness (PF) relationship to the quality of life (QF) have been discussed with great emphasis in scientific literature. It is well known that weaving a health behave in children and teenagers produces an adult with less chances in developing chronic noncommunicable diseases (CND).

On this way, The turn of the XX century into XXI century is marked by the increase even higher in the speed of the technological development in the society life around the world, leading to a CND caused by the sedentary that in generated by long periods sit in front of computers and smartphones, increasing the levels of physical inaptitude and cardiovascular disease risk.

Cardiovascular diseases (CVD) are the main death cause around the world, and in Brazil, it takes round 30% of the obituary (Rocha & Martins, 2017). Besides CVD, its risk factors as dyslipidemia, smoking, sedentary and obesity, generally known as CND, are the death cause in order of 71% around the world, varying from 37% to 88% in low income to high-income countries, respectively (Pan-American Health Organization [PAHO], 2018). It is well established the relationship in the CVD and CND, mainly the central lipid distribution obesity (Oliveira, Fagundes, Moreira, Trindade & Carvalho, 2010; Mendonça, 2016; Lima, 2018, Nahas 1999; Nahas 2003).

Even though these diseases become evident only in adult phase, it is more and more clear that its development starts in childhood and teenage, being a well efficient prevention a regular physical activity practice during the early life decades (Tenório, 2010; Freitas, Rodrigues, Yagui, Carvalho & Marchi-Alves, 2012).

The reduction, in different ages and genders, on the levels of habitual physical activity and PF is a more frequent situation nowadays in many countries around the world. This fact is contrary of other ages in which the well-being in PF was fundamental on survival, due to hunting, fishing and agriculture actions demands on the physical capacity (Guiselini, 1999; Glaner, 2003; Freitas Junior, 1995; Nahas, 2003).

On this view, the PF components related to the morbidity and mortality and/or to a better diary activities performance are cardiopulmonary fitness, muscle resistance/force, flexibility and body composition (Astrand, 1994; Pollock et al, 2000; Pescatello et al., 2014).

In face of this, this population's health and QL patterns have become compromised, as well as others obesity associated dysfunctions such as sleep disorders. Researches associated high sleepiness prevalence to the Metabolic Syndrome and CDV main components (Mansur et al, 2015) and that weight loss plays a main role in enhance the gravity levels of sleepiness disorder (Patel & Mehra, 2015).

For children and adults, the sleep hours per night are inversely related to Body Mass Index (BMI) and obesity in cross-sectional studies, and incident obesity in longitudinal ones. The sleep privacy in animals produces hyperplasia. This sleep privacy provokes decrease in leptin and the thyroid stimulating hormone (TSH) secretion, increase in ghrelin levels and decrease in glucose tolerance in animals and human beings, including increase in hunger and appetite. These are changes due to chronicle sleep privacy leading to an increase in obesity risks (Brazilian Association for the Study of Obesity and Metabolic Syndrome [BASOMS], 2016).

Therefore, is evidenced enhance an in fatigue manifestation associated to sleep privacy and obesity in young college students, with a positive correlation in the first graduation course years and BMI in some researches (Tombolato, 2005; Amaducci, Mota, & Pimenta, 2010; Simão, 2006; Coelho Ravagnani, 2006).

Although the small number of young college students studies, the relationship between fatigue existence and learning process can impair professional education and the population QL. Graduation under stress students research have discovered indicative symptoms of psychic stress, sleep disorders and others physical expression symptoms (Farah, 2001).

This way, young people PF development enables a better QL and health perception on this population and, consequently, a cardiovascular risk (CVR) decrease. However, daily sleepiness and fatigue investigation is necessary in order to comprehend teenagers behave. Then, we intended to investigate the relationships PF and CVR in QL and health of young college students.

1.1 Physical fitness related aspects in young college students.

Regular physical activity plays a main role in maintaining and improving PF, as well as enhance health, decreasing the appearance possibility of diseases and chronicles grievance

including cardiovascular disease, diabetes, osteoporosis, dyslipidemia, depression and some cancer types, as well as decreases the musculoskeletal grievance (Canadian Society For Exercise Physiology [CSEP], 2004; Lichtenstein, Appel, Brands, Carnethon, Daniels, Franch, Franklin, Kris-Etherton, Harris, Howard, Karanja, Lefevre, Rudel, Sacks, Van Horn, Winston & Wylie-Rosett, 2006; Pate, 1983; Zoeller, 2007). Based on this information, good PF levels can bring health benefits to people, also contributing to improve the QL.

PF is defined as a set of individual attributes or characterizes, relating to the capacity of realizing physical activity. These characteristics are generally separated in health related ones and PF abilities components (American College of Sports Medicine [ACSM], 2014). Due to the increase in life expectation, have been an interest increase in the last one over the other sportive, motivated by the recognition in the growing role of the regular physical activity in health promoting and maintenance (Caspersen, Powell & Christensen, 1985; Paffenbarger, 1994).

So, in the health area PF is related to the individual capacity of realizing diary activities vitally, showing less devolving risk in disease or chronicle-degenerative conditions associated to low physical activity levels (ACSM, 1998). There is an even larger number of evidences that prove health benefits from PF (CSEP, 2004; Lee & Paffenbarger Junior, 2000; Zoeller, 2007).

It is known that the gain in lasting physical activity habits occurs during youth, so seems reasonable think that stimulating behave changes during these young ages in order to maintenance in hole lifetime (Lopes, Maia, Oliveira, Seabra & Garganta, 2003; Souza & Duarte, 2005).

Thinking about health and QL, good levels in PF help in developing diary tasks (Caspersen, Powell & Christensen, 1985), disease risk factors, stress levels and depression decrease and improve in self-esteem (CSEP, 2004); as well as its components maintain biological attributes promoting some protection to appearance and development in organic disorders, induced by functional condition impairment (Pate, 1983; Yancey, Fielding, Flores, Sallis, Mccarthy & Breslow, 2007).

However, despite several technological progress, contemporary lifestyle induces people to a physical inactivity (PI) life and to adopt unappropriated life habits from childhood, getting worst during adult age in which responsibilities take place (Blair, Norton & Leon, 1996; U.S.Department Of Health And Human Services, 2007).

1.2 Health related to aspects: QL perception, sleepiness and fatigue levels.

Metabolic disorders, including obesity, dyslipidemia Type 2 Diabetes Mellitus (DM2) have increased your prevalence around the world reducing QL, elevating diary life impairments and morbidity levels high (Robinson; Buchholz; Mazurak, 2007). DM2 is a common health condition and in Brazil affects near 7.6% of the population becoming more frequent as the age progress and body fat increase (Moraes et al., 2010). This is meaningful as the adults behave is a reflection to teach newer generations.

In search to clarify these statements, the World Health Organization (WHO) defines QL as an individual's current life state perception regard to cultural context, assumed values system and its expectations relationships, interests and life goals. This way, it is a wide and subjective concept that goes by physical health, psychological state, independence levels, social relationships, with friends and family, and personal wishes of each human being (World Health Organization [WHO], 2000 e 1997).

Among every human being needs of having a good QL are included good cardiopulmonary condition and a good usage of oxygen by the skeletal muscles. Physical activity, which is defined as a body movement that requires energy cost, is the main pillar for this process (Praet et al, 2008).

The physical exercise practice, possibly, reverses the harmful effects associated to the sleep hours. This can be related to the produce of brain derivative neutrophil factors, especially in the hippocampus responsible for the memories (Saadati et al, 2014). Cognitive and behave researches point to an improvement in space-based memory, learning and humor (Havekes; Vecsey; Abel, 2012; Zagaar et Al., 2012; Zielinski et al., 2013), besides providing advance or delay in sleep time, depending on time, on day and on intensity in which is realized (Antunes et al, 2008).

There still is a lack of consensus among researchers about the diary physical activity amount needed to be a decrease in diary sleepiness as well as fatigue personal perception in young college students, otherwise, it is well known that a higher amount of systematic physical activity brings benefits by, probably, increasing physiological, psychological and psychosocial factors.

1.3 Justification

The PI carries out an increase in the physical inaptitude and an increase in body fat, supporting, many times, the arterial hypertension and hypercholesterolemia (Brandão, Pimentel, Silva & Cardoso, 2008), so these ones become the main cardiovascular disease (CVD) risk factor.

The CVD risk factors can be divided in two categories: changeable risk factors (environmental and behavior ones) as smoking, high serum cholesterol, systemic arterial hypertension and PI, and secondary diabetes, obesity, stress, contraceptive use and abdominal obesity; and non-changeable risk factors (genetic and biological ones) as heredity, gender and advanced age (Correia, Cavalcante & Santos, 2010). Some of these risk factors are studied in this research (SAH, PI, abdominal obesity, gender and age).

Previous researches point arterial hypertension is associated to a larger CVD incident, which represents an important public health issue and is the main death cause among adult population in majority of the countries (Brandão et al., 2008; Moreira et al., 2011; Simão, Nahas, & Oliveira, 2012).

The majority causes in hypertension appearance in young college students has been the lifestyle changes, by entering the university aside from becoming sedentary ones, food habits modification alters their metabolism, as well as body composition, turning them into over weighted or obese ones (Fachineto & de Sá, 2008; Guedes, 2013b; Rodrigues, 2012).

In reference to the abdominal fat that maintains a direct relationship to visceral fat, high risk factor to CVD, obesity has been demonstrated to be prevalent in college population (Lubango, 2008; Maia, Veras, & de Souza Filho, 2010), a much worrying data as WHO affirms that CVD will be the first place of the death causes over the world in the next years, becoming part of the CND that has been reaching many people due to PI (WHO, 2010).

1.4 Research Problem

This research issue is to verify PF, health and QL relationships in young college students. Considering the high number in obese and sedentary young people this study pursued to comprehend this population behave and the relationship between diary sleepiness, fatigue and anthropometric variants and, in consequence, the CVR. This directly reflects on social and cognitive performance by the students. In front of this, we observed young people with

cognitive dysfunctions and mental health issues, like anxiety and depressive symptoms. The overflow of information and the use of electronic devices has led to a change in this population behave affecting various factors associated to QL. This study intends to investigate the factors related to PF and the young college students health levels. Then, raises the question: "Which are the PF effects on health and CVR factors prevalence among young college students? What are the relationships in QL, daytime sleepiness, fatigue and anthropometric variants in this population?

1.5 General Objectives

The general objective in this study was to investigate the PF effects on CVR and QL perception, and health levels on young college students.

1.5.1 Specific objectives, study 1: Association between Physical Fitness and Cardiovascular Risk in Young College Students: a Systematic Review

Systematic review about the association between Physical Fitness and Cardiovascular Risk in Young College Students.

This study aimed specific to:

- Investigate PF effects on young college students throughout a systematic review;
- To revise and to verify the existing theoretical framework to evaluate the PF effects on CDV risk in young college students.

This systematic review was realized in agreement to the Preferred Report Items for Systematic Analysis and Meta-Analysis protocol (PRISMA) - Meta-analysis and Systematic Review reports guidelines. In the present study were included researches that have analyzed PF association to CVD risk factors in young college students.

According to the study sample criteria, it was considered the following: 1) cross-sectional studies; 2) studies that aimed to investigate the association between PF and CVD risk factors; 3) studies in which the participants age varied among 18-30 years-old; 4) studies published in English language specialized journals; 5) studies published in journals from 2007

January to 2018 December; 6) studies that have evaluated participants sedentary and PF levels through physical tests, surveys and biomarkers.

Studies based on the following criteria were excluded: 1) longitudinal studies; 2) military participants studies; 3) pregnant or postmenopausal women; 4) participants with comorbidities (obesity, cancer, AIDS/HIV, degenerative diseases, neurological conditions. The studies were imported to the *EndNote® software* and the duplicated ones were excluded by using the "duplicated" command.

1.5.2 Specific Objectives, study 2: Cardiovascular disease risk factors prevalence among young college students.

This study specific aimed to analyze the health level relating the PF to the hemodynamic and biochemical variant in young college students.

1.5.3 Specific objectives, study 3: Association in QL, sleepiness state, fatigue and anthropometric variants in young college students.

This study aimed to investigate the association between CVR, QL, daytime sleepiness, fatigue and anthropometric indicators in young college students.

1.6 Hypotheses

- The PF relates positively to health and QL;
- The PF relates negatively to CVRs;
- The anthropometric variants relate to QL and health;
- The daytime sleepiness and fatigue relate to health;
- The biochemical and hemodynamic parameters can be altered due to PF levels.

1.7 Thesis structure

The thesis structure is based on the Scandinavian model, so is divided in four chapters corresponding, in sequence, to: general introduction; relevant area journals accepted our sent

papers, formatted in according to the stablished publishing patterns; Final considerations, limitations and new researches perspectives; and, finally, practice implications.

The Chapter 1 presents the study introduction, leading to a short review on the general pertinent aspects of health and PF, focusing in young college students, highlighting the more relevant aspects in the study. It also presents the study justification, development the question of analyzing PF effects on CVR and QL perception; approaches the issue of daytime sleepiness, fatigue and the anthropometric indicators in health, as well as its effects on QL. The objective are detailed presented due to each chapter study and, in addition, there is a general thesis structure summary.

The chapter 2 is based on a systematic review with the assessment on verifying the effects of PF on cardiovascular disease prevalence and on the health and QL dimensions among young college students.

The chapter 3 is inserted into the experimental part of the research with two studies realized as long as the research period. The relationship between coronary risks, PF and biochemical and hemodynamic variants was studied in the Study 2. In the Study 3, was analyzed the association existence among QL, excessive daytime sleepiness (EDS), fatigue, anthropometry and physical activity level as cardiovascular disease risk factors in young college students.

The chapter 4 is dedicated to refer chapters 2 and 3 papers final considerations, thesis limitations and new researches perspectives after these study contributions about the research done.

In the end, the chapter 5 presents the bibliographic references used in each study are demonstrated as well as in the end of each study (chapter) in accordance to the rules of each submitted journal.

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SYSTEMATIC REVIEW

2

Chapter 2: Systematic Review

Study 1. Association between Physical Fitness and Cardiovascular Risk in Young University Students: Systematic Review

Abstract

His aim of this systematic review was to analyze the association of PF with risk factors for CVD in university students. Studies were collected from the following database: Mideline, using the keywords: "PF" and "CVR", associated with keywords: "Students" and "university". It was included epidemiological observational articles published between 2007 and 2017 written in English language. It was selected four quantitative cross-sectional studies, according to specific eligibility criteria, PRISMA. The data extraction was done independently by different authors, including assessment of bias risk and classification of evidence rating. The results shown that university students have a sedentary behavior and low aerobic fitness, with high index of dyslipidemia, central obesity, high blood pressure, therefore confirming many risk factors for cardiovascular diseases.

Key words: Physical fitness; cardiovascular risk; Students; University.

Introduction

PI leads to a reduction in PF while tends to increases body fat, thus, contributing to arterial hypertension and hypercholesterolemia (Crepaldi et al., 2016; da Cruz, Oselame, Dutra, Oselame & Neves, 2017; Gasparotto, Gasparotto, Sales & Campos, 2013; Mariano, Ferreira, Amaral & Oliveira, 2017). Both conditions are main risk factors for CVD.

The main cause for the installment of hypertension in young university students is the change in lifestyle after their entrance in college, since not only their tend to become sedentary, as previously explained, but in addition, there is also changes in their eating habits, and thus, altering their metabolism, as well their body composition (Fachineto & de Sá, 2008; Guedes, 2013; Rodrigues, 2012).

Regarding the abdominal fat, which has a direct relationship with visceral fat, a risk factor for CVD, it has been reported that obesity have a high prevalence in university population (Lubango, 2008; Maia, Veras & de Souza Filho, 2010). This data is alarming since the WHO stated that CVD would be the first cause of death in the world in the next years. These CVD are included in the group of CND, which are affecting patients due to PI (WHO, 2015).

The CVD has been responsible for 30% of deaths in Brazil. Each five patients that are in critical conditions in Brazilian hospitals, at least one have a CVD (Barim, Carvalhaes, McLellan, Corrente & Castanheira, 2016; Ribeiro et al., 2016; Vigitel, 2017). The high prevalence of this problem places Brazil among the 10 countries with the highest rate of death for CVD (WHO, 2015, 2016).

The risk factors for CVD are divided in two main categories: modifiable risk factors (environmental and behavior), such as: smoking, high serum cholesterol, hypertension, PI and secondary: diabetes, obesity, stress, contraceptive pills and abdominal obesity; and non-modifiable risk factors (genetic and biologic), such as heredity, sex, ageing (Correia, Cavalcante & Santos, 2010). In the present study, several of these variables, will be analyzed (hypertension, PI, abdominal fat, sex and age).

Studies showed (Brandão, Pimentel, Silva & Cardoso, 2008; Moreira et al., 2011; Simão, Nahas & Oliveira, 2012) that hypertension is associated with incidence of CVD, which not only represents a public health problem, but are also the main cause of death in adult population around the world.

This systematic review aims to analyze the association of PF with risk factors of CVD in university students.

Methods

This systematic review was conducted according to guidelines for reports PRISMA (Galvão, Pansani & Harrad, 2015). In the present study, included studies assayed the association of PF with risk factors for CVD in young university students.

Eligibility criteria and selection of studies.

Regarding the selection criteria of the studies, only the following were considered: 1) Cross-sectional studies; 2) Studies that aimed to investigate the association between PF and risk factors for CVD; 3) Studies which participants' age ranged between 18 and 30 years; 4) Studies published in peer reviewed journals in English language; 5) Studies published in journals from

January 2007 to December 2017; 6) Studies which evaluated sedentary levels and PF of participants through physical tests, questionnaires and biomarkers.

It was excluded studies based on the following criteria: 1) Longitudinal studies; 2) Studies that included military participants; 3) pregnant women or in postmenopausal period or; 4) participants with comorbidities (obesity, cancer, AIDS/HIV, degenerative disease, neurological conditions). The studies were imported to EndNote® software and the duplicated were excluded using the "duplicated" command.

The selection process of the studies were made in the following steps: At the first step, two independent reviewers searched potentially relevant studies. Both reviewers selected 247 articles. At the second step, two reviewers analyzed abstracts of studies chosen at the first step. In case of disagreement regarding the inclusion of studies in the next step, these were removed through the mediation of a third reviewer. In the third and last step, studies selected on the previous steps were completely analyzed by three independent reviewers, taking into consideration the previously mentioned eligibility criteria. In this step, divergences between reviewers regarding that inclusion of articles were solved through consensus between them.

Information sources

Systematic searches were made in April 2018, by three independent authors, using Medline database. The keywords used in searching for literature were among: "PF" and "CVR" associated with the following words: "students" and university". Manual searches were also performed which consisted in the use of a reference list in identified articles. Search in database were made during January 2010 to December 2017. Furthermore, search in database and on the reference list of studies were analyzed to identify new studies that could be included in this article.

Study Selection

Three authors tracked the title and the abstract of all citations found in literature searched. Studies with potential relevance were searched by full text and eligibility criteria as applied. According to PRISMA recommendations, inclusion and exclusion criteria were based

on relevant characteristics of the present study (young university student, risk factor for CVD, PF). Articles were included if: (1) was a cross-sectional study with young university students with 18 to 30 years; (2) aimed to assay the association between risk factors of CVD and PF. The different steps of the research along with number of studies reviewed in each stage and the reasons for exclusion were showed in figure 1.

Data extraction and risk of bias in individual studies

The three reviewers involved in studies selection extracted the data independently. Characteristics from studies, including authors, country in each research was conducted, methodological design, students' profile, instruments to assay sedentary behavior, instruments for psychological evaluation, indicators, results and conclusions were registered. In this stage, divergences regarding data were resolved through reviewer consensus.

It is necessary a careful evaluation of bias risk in each observational study, which explains the self-context to analyze the reliability of studies results (Vandenbroucke, 2011). The risk of bias in were estimated using Research Triangle Institute (RTI) item bank (Viswanathan, Berkman, Dryden & Hartling, 2013). However, the RTI item bank was adapted to attend the characteristics of studies included in the present review. Thus, the following items for bias assessment were considered: selection bias, confounding selection bias, confounding detection bias, friction bias, report of selective results, confounding and global evaluation. The assessment of these items were based on the following answers: "yes"; "no"; "partially"; "impossible to determine"; "not applicable".

A text box were included for each item to register the explanation regarding the evaluations for additional review (Viswanathan et al., 2013). Therefore, according to the answer of these items and the respective explanations, the studies were classified as (good, modest and poor) by adaptations of criteria suggested by (Balk et al., 2006). To minimize the risk of bias during the bias assessment of studies, two reviewers independently analyzed the results by calculating the interlude agreement using kappa coefficient (Cohen, 1960). Thereafter, reviewers compared their scores and in cases of divergence, a third reviewer was included to mediate an agreement.

Classification of evidence strength.

The goal of evidence strength is to provide clear judgment regarding the reliability of reviewer conclusions (Atkins, Fink & Slutsky, 2005). The classification of evidence strength of main results were conducted through strength classification of evidence systems (Berkman et al., 2013). This system allowed the distribution of results in five domains (limitations of the study, accuracy, consistence, bias report). Thereafter, the strength of the results were allocated in one of the four levels: High, moderate, low, insufficient (Berkman et al., 2013). Two reviewers individually analyzed the strength of the study results and calculated rate of interlude agreement using kappa coefficient (Cohen, 1960). Then both reviewers compared scores and in cases of divergence, a third reviewer was in included to mediate the final agreement.

Results

Initially, it was found 247 studies potentially relevant for this review. The different steps of research, the number of reviewed studies in each step and the reasons for exclusion are presented in figure 1. Only four articles were considered eligible to be included in this review. Therefore, 243 articles were excluded for different reasons: Samples using animals, age out of the established range, profession of the subject (military and athletes), and samples associated with comorbidities, among other reasons.

The first excluded article (Cardiorespiratory Fitness, Sedentary Time, and Cardiovascular Risk Factor Clustering), analyzed whether a high cardiorespiratory capacity is associated with reduced deleterious consequences for health which in turn is correlated with sedentary behavior through a cross-sectional study with 12.274 men and 14.209 women without known cardiovascular disease, with minimum age of 20 years but without age limit. This resulted in exclusion of the study.

The second excluded article (physical exercise and cardiac autonomic activity in healthy adult men) verified the effect of exercise in autonomic cardiac control in adult men. In addition, it was assayed the level of daily physical activity, however, it was conducted in non-university students and the methodology adopted was comparative longitudinal.

The third non-eligible article (Blood Pressure and Circulatory Relationships with Physical Activity Level in Young Normotensive Individuals: International Physical Activity Questionnaire Validity and Reliability Considerations) aimed to evaluate the relation between International Physical Activity Questionnaire (IPAQ) and blood pressure, blood flow and vascular resistance in normotensive patients with university age. Although, vascular occlusion was included in methodology, which in turn led to the exclusion from this review.

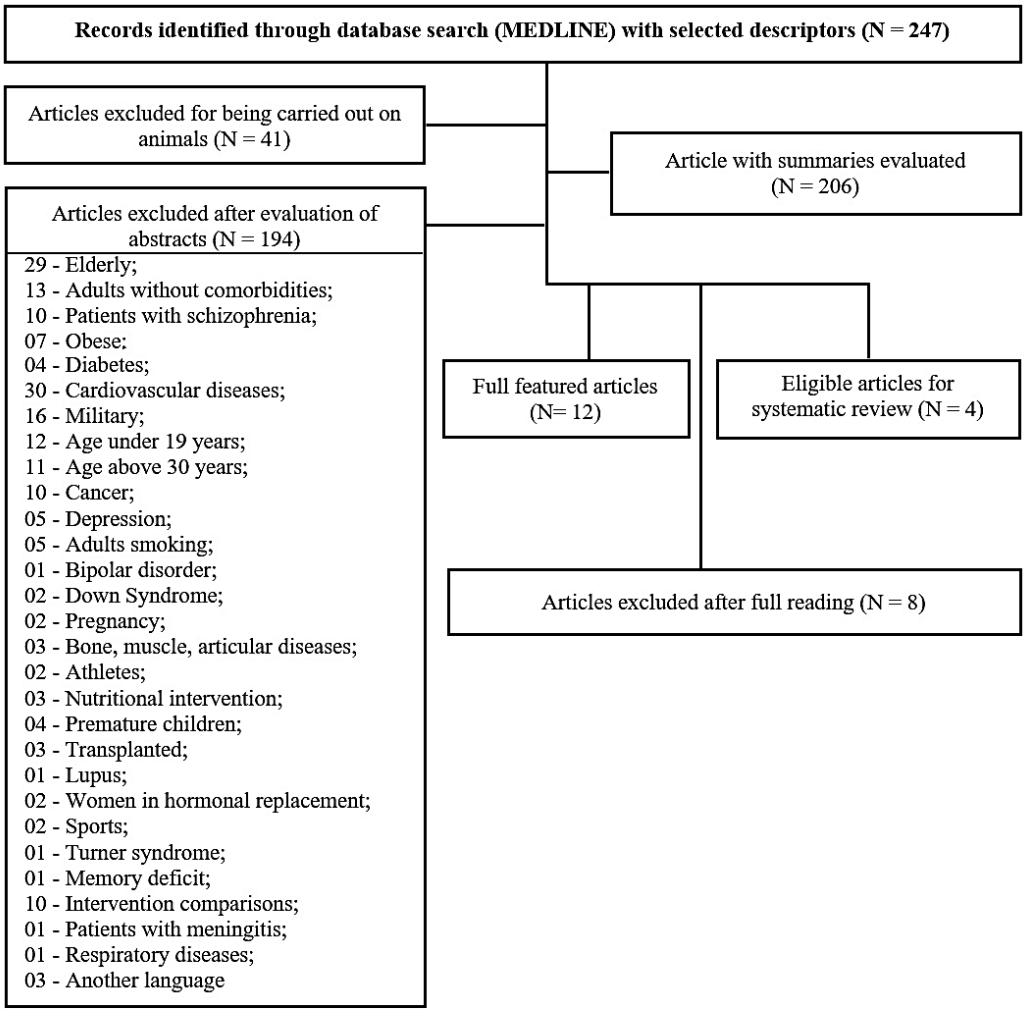
The fourth article (Muscular fitness and cardiometabolic risk factors among colombian young adults) aimed to determine the relation between muscle fitness with risks markers for cardiometabolic in 172 men with age ranging with 18 to 24 years through a descriptive cross-sectional study. The study was published in Spanish and university students, factors that led this study to be excluded, did not compose the sample.

The fifth article (Associations of Leisure Time, Commuting, and Occupational Physical Activity with PF and Cardiovascular Risk Factors in Young Men) correlated different domains of physical activity and risk factors for cardiovascular disease in militaries. This fact invalidated the study to be included in the final review.

The sixth article excluded (cardiometabolic and behavioral risk factors in young overweight women identified with simple anthropometric measures) investigated markers for cardiometabolic risk in young women with 18 to 30 years to verify whether waist circumference (WC) measures and BMI were associated similarly to cardiometabolic risks. Due to the overweight seen in the subjects, the article was excluded after final review.

The seventh article (Associations of Maximal Strength and Muscular Endurance with Cardiovascular Risk Factors) was also excluded due to military sample. This study aimed to verify whether the muscle or cardiorespiratory fitness are significantly associated with scores of risk factors for cardiovascular diseases, independently.

Figure 1 - Review Studies Flowchart



Source: Prepared by the authors, 2018.

The general characteristics from the reviewed studies are shown in table 1 and 2. Data presented in table 1 on the following order: author, number of participants, sex, age, city, country and year of publication. The number of participants ranged from 35 to 2168. Mean age found was 24 years with minimum age as 18 years old and the maximum age as 30 years old. Publication period was from 2013 to 2017, in four different continents: African, European, American and Oceania.

Table 1 – Characteristics of studies included in this review.

Author	Sample	Age	City/Country
Prioreschi, Brage, Westgate, Norris & Micklesfield, 2017	409 (218 men and 191 women)	19-20	Soweto/África
Fernstrom, Fernberg, Eliason & Hurtig-Wennlof, 2017	834 (257 men and 577 women)	18-25,9	Uppsala/Sweden
Martinez-Torres et al., 2017	890 (427 men and 463 women)	18-30	Bogotá/Colombia
Liberato, Maple-Brown, Bressan & Hills, 2013	35 Men	18-25	Darwin/Australia

Source: Prepared by the authors, 2018.

Table 2 describes the following information: Objectives, anthropometry, physical tests, metabolic tests and main results. The outcome investigated was the risk for CVD associated with different variables. Furthermore, the main goal was to associate PF, cardiovascular fitness (CF), levels of physical activity body composition, and metabolic variables. Three out of four chosen articles applied assayed fasting blood sugar. Other applied tests were: cholesterol, low density lipoproteins (LDL –c), high density lipoprotein (HDL –c) and triglycerides.

All articles used anthropometric test BMI. A considerable number of men presented normal index, around 40% of the sample was considered with overweight, and obesity despite they self-consider healthy.

Regarding the studies that assayed maximum oxygen volume (VO_{2max}), the majority of the sample showed high and normal levels. All articles found association of at least one the following variables with CVD: Sedentary behavior, low intensity exercise associated with overweight and obesity, excessive adipose tissue and low PF, bad eating habits, low levels of VO_{2max}, reduced strength and low aerobic fitness; male with more than 23 years and overweight or obese and bad ratio waist height associated with metabolic syndrome; sedentary behavior associated to WC, fasting hyperglycemia, high cholesterol and triglycerides levels. One of the articles provides evidence that high levels of PF abolished adverse effects associated with high sedentary time.

Table 2 – Description of objectives, anthropometric variables, physical tests, metabolic tests and main outcomes from included articles.

Author	Objectives	Anthropometry	Physical Tests	Metabolic Tests	Main results
(Prioreschi et al., 2017)	Describe and verify the association between levels of PF, PhA and BMI	- BMI	- Submaximal step test - Electrocardiogram - Accelerometer		Moderate and vigorous PhA are associated with PF; Women have higher risk of CF reductions
(Fernström et al., 2017)	Evaluate and analyze the association between the tunica intima of carotide with factors related to lifestyle and CVD	- BMI - Bioelectrical impedance	- Stationary bicycle test -Ultrasonography	- Fasting blood glucose	High aerobic fitness is associated with low risk for CVD in young adults and high prevalence of young adults with high LDL and insulin resistance.
(Martínez-Torres et al., 2017)	Evaluate the association of MS with CVD risk	-RWH - Bioelectrical impedance		- Fasting blood glucose - Cholesterol - LDL-c - HDL-c	Risk factors for MS included: Male, with more than 23 years, with obesity or overweight with a non-healthy proportion between waist and height.
(Liberato et al., 2013)	Investigate the association between BC, HB and risks for CVD	- BMI - WC - HC - DEXA	- Blood pressure assessment - Energy expenditure (METs)	-Fasting blood glucose - Cholesterol - LDL-c - HDL-c - Triglycerides	Elevated risk factors for CVD in healthy men.

Source: Prepared by the authors, 2018.
PF – Physical Fitness, CF – Cardiovascular fitness, PA – Physical activity, BMI– Body Mass Index, WC – Waist Circumference, HC – Hip circumference, CVD – Cardiovascular disease, MS– Metabolic Syndrome, ST – Sedentary time, BC – Body composition, HB – Healthy behavior, DEXA - Dual-energy X-ray absorptiometry.

Discussion

This systematic review, by analyzing 2168 subjects, being 937 man and 1231 woman, suggests that physical exercise significantly improves PF, CF and reduces CVD biomarkers related to lipoproteins, glucose intolerance, insulin resistance and anthropometric makers. Furthermore, we identified important variables, which modify the effects of exercise in cardiovascular health of young adults, including age, sex, intensity of exercise and present health condition.

PF is an important factor to improve health and to reduce stress considering that physical activity promotes physiological and psychological benefits (Deuster & Silverman, 2013). Studies regarding young university students are scarce in literature, urging the need for a large intervention in this population.

A previous study points that health perception is related to physical activity in two samples of adults in 1990 and in 2015. However, multivariate models and mutually adjusted

suggests that the most important variables for perceived physical health could have change from $VO_{2máx}$ and chronicle degenerative diseases in 1990, to age, BMI and educational level in 2015 (Olsson et al., 2018). These findings demonstrate the relevance and the comprehension of multicausality to understand the concept of PF in health perception, and consequently, CVR in adults. Similar reports were not found for young university students.

Metabolic markers are health predictors in young university students. In addition, it is also indicators for better CF. Previous studies states that PF, but not muscle strength, are risk factors for premature death in young adults with amyotrophic lateral sclerosis (ALS) (Longinetti et al., 2017; Mattsson, Lönnstedt, Nygren & Askmark, 2012). This indicates that a common factor is subjacent to PF as for risk of ALS.

These results suggests that aerobic conditioning is correlated with a better cognitive control and to the development of a more proactive behavior during tasks performed by teenagers.

In this review, it was shown that higher levels of triglycerides, LDL-c, Fasting blood glucose, and total cholesterol were correlated with reduced PF. However, CVD markers such as adipocytes and inflammatory biomarkers have not been analyzed in study. The relevance of this question regards the fact that cardiorespiratory fitness and adiposity influence the risk of CVD mediated through inflammatory processes (Sun et al., 2014). Intervention programs that aims to improve PF, reduce child obesity and keep physical condition and weight in later life, could lead to reductions in inflammation process in adults. PF lowers the risk of cardiovascular events, reducing inflammation (Church et al., 2002; Nauman, Stensvold, Coombes & Wisloff, 2016; Williams, Milne, Hancox & Poulton, 2005). A meta-analysis study from (Lin et al., 2015) showed that exercise significantly improved cardiorespiratory fitness and cardiometabolic biomarkers. Effects of physical exercise were modified by age, sex and health condition. The results of this study have significant implications for planning interventions for physical exercise in young university students (Lin et al., 2015).

Three analyzed studies involving both sex show data of differences between men and women regarding the risk of CVD. This results corroborates with other studies in literature that points greater risk for men due to lifestyle and overweight while woman have an increased risk to adopt sedentary behavior(Martínez-Torres et al., 2017; Prioreschi et al., 2017).

Moreover, both are associated with levels of physical activity, IMC and insulin resistance. Secchi, García, España-Romero e Castro-Piñero (2014) reports that male children and teenagers shows higher levels of PF. These differences increases with age, though. Approximately one in three participants shows poor aerobic fitness indicating risk of a future CVD. Prioreschi et al (2017) evaluated 409 young black south african (with age of 19 and 20 years) and stated that overweight and obesity are more prevalent in women rather than men (35% vs 8%, $p < 0.001$). However, men demonstrated higher values for VO_{2max} compared to women (Prioreschi et al., 2017). In addition, elevated levels of sedentary behavior in this population might be a factor that contributes to prevalence of overweight and obesity in this population.

The analysis of studies that composed this review shows significant clinical implications for this specific population. Corroborating with previous studies (Brandão, Cardoso & Pimentel, 2010; Brandão et al., 2008; Crepaldi et al., 2016; Correia, Cavalcante & Santos, 2010; da Cruz et al., 2017), moderate and vigorous physical exercise are related to benefic effects in PF, cardiorespiratory fitness and cardiometabolic health. It was observed that differences in risk for CVD between the exercise and control group are significantly modified by lifestyle, BMI and intervention duration (Panda & Krishna, 2014; Racette et al., 2014; Ramírez-Vélez, Meneses-Echavez, González-Ruíz & Correa, 2014; Sánchez-López et al., 2013; Vaara et al., 2014). These findings suggests that exercise interventions could produce similar effects for cardiovascular health in these populations independently of these factors. Furthermore, the efficiency of physical conditioning might be different depending on age, sex and health condition.

Limitations of the study

Although the studies aim to evaluate the association between PF with risk for CVD in young university students, the heterogeneity among the studied population (geographic, age and number of subjects), the methodology of intervention and the analyzed variables, which turns difficult to compared the results at the same time that raise relevant questions regarding the association of PF with CVD in young university students. Another limitation is the reduced number of works with the theme.

Suggestion for future studies

Since the association of PF and risk factors for CVD are significant, other indicators should be analyzed to make studies with this population more robust. Evaluate and compare stress, sleep quality, metabolic and inflammatory variables could be a strategy to find more evidences regarding PF and CVD. Increase projects complexity should be considered in the future. Therefore, would be pertinent find other investigations though experimental designs, with both sexes, allowing to clarify the casual relation between CVD and physical activity.

Conclusion

Results showed that young university students are presenting sedentary behavior along with low aerobic fitness, with high rate of dyslipidemia, central obesity, high blood pressure, factors that predicts CVD. Although there is a significant number of evidences presented this review, they are not consistent due to the small number of publications with the studied population in the last 10 years that compare the relation between sedentary behavior of young university students and analyzed indicators. Therefore, more studies are needed.

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EXPERIMENTAL STUDIES

3

Study 2. Cardiovascular Disease Risk Factors Prevalence among Young College Students

Abstract

The prevalence of PI among young college students is shown in high levels nowadays and has become a serious issue in public health, being a consequence of the modern society in which the capitalism and the technological development dictate social behave. This study aims to evaluate the health levels relating the PF to biochemical and hemodynamics variants in young college students at Fortaleza/CE. It is characterized by a oobservational study, based on an epidemiological survey of 90 university students, with primary data and quantitative analysis model. It was shown the volunteers majority were physically active. Anthropometric variants were positively correlated to the systolic arterial pressure ($p<0.05$), on the other hand, diastolic arterial pressure was not positively correlated to these variants ($p> 0.05$). Heart rate (HR) test behaved linearly to the anthropometric variants ($p< 0.05$). It was observed a positive correlation between oximetry and waist-hip ratio (WHR) ($R= 0.35$; $p= 0.001$). The diary physical activity levels is presented as protective factor against the appearance and development in CND, and one of the great relevant protective factors to be observed and evaluated is the WC. Thus, knowledge about the prevalence of risk factors for noncommunicable chronic diseases in young adults needs further clarification.

Keywords: Risk factors, cardiovascular disease, Young adult, university.

Introduction

The turn from sex XX to XXI is marked by the even faster advancement of technology in the life of society worldwide, leading to a growing number of CND, caused by sedentary lifestyle generated by long periods sitting in front of people. Computer screens and smartphones, thereby increasing the rates of physical disability and risk of cardiovascular disease.

Despite the occurring of these kind of disease appears generally in the adults, it is evident your relation to the initial development in young ages as childhood and teenage. This way, the regular physical activity practice during the early two decades of life seems efficient on the prevention of the risk factors (Tenório, 2010; Freitas, Rodrigues, Yagui, Carvalho & Marchi-Alves, 2012).

The reduction, in different ages and genders, on the levels of habitual physical activity and PF is a more frequent situation nowadays in many countries around the world. This fact is contrary of other ages in which the well being in PF was fundamental on survival, due to

hunting, fishing and agriculture actions demands on the physical capacity (Guiselini, 1999; Glaner, 2003).

Based on this, it is important to know the pattern and tendencies of physical activities among young college students, emphasizing that is during this period of age that personality and habits are fixed and that the entering in the university proportionate new relationships to the possibilities or not on the adoption of sedentary habits.

The PI prevalence among young college is being presented as high, mainly in freshmen, although the results are controversy (Corseuil & Petroski, 2010; Pires, Mussi, Cerqueira, Pitanga & Silva, 2013). The principal associated aspects related to a sedentary behave are lack of time, motivation and social support and the distance between home and spaces destined to the physical activity (Loch, Konrad, Dos Santos & Nahas, 2006).

On the other hand, meanwhile this diminish in physical activity demand along the days, several evidences of the benefits on regular practice of physical activity and maintenance of adequated levels of PF are accumulated (Araújo & Araújo, 2000; Coelho & Burini, 2009).

This way, the PF components related to the reduce of mortality and morbidity and/or to a better diary activities performance are: cardiopulmonary fitness, muscle resistance/force, flexibility and body composition (Astrand, 1994; Pollock et al, 2000, Pescatello et al., 2014).

Then, is believed the maintenance of appropriated physical fitness related to health (PFRH) levels can contribute in large scale to an increase in longevity, modifying PFRH levels that seems to be inferior in non-trained adults in comparison to your young pairs (Dias et al, 2008). The scientific community have been overall attracted by this perspective like government agencies as the growth process which is characterized by a decrease in structural and functional organism capacities that could lead to a diminish in the mobility and functional competence (Blair et al, 1995).

Based on this, rises an argument: how is the current PFRH of young college students? In addition, what about these young adults health situation related to cardiovascular and associated disease?

Then, this study aims to evaluate the health level relating the PF to the hemodynamic and biochemical variant in young college students at Fortaleza/CE-Brazil.

Methods

This is an observational study from an epidemiologic survey in college students, with primary data and a quantitative analysis model.

The Ethics and Human Research Committee of the Fametro University Center approved the research protocol, under the number 2.089.272 and Presentation Certificate for Ethical Appreciation under the number 65185717.8.0000.5618, and the Free Informed Consent following the rules for researching with human beings.

Sample

The college students were all informed about the research objectives and the adopted procedures, as well as the volunteer character of the study. The sample choice was made by random to number the total of 90 college students, being 23 male (25.6%) and 67 female (74.4%) with age range from 18 to 30 years old. The collect procedure occurred during the second semester of 2018. The sample participants were from various college courses, excluding Physical Education.

Procedures

Eleven previously trained evaluators conducted all research stages. The data collecting was realized throughout: the participants reading and signing the Free Informed Consent, replying IPAQ, after that the participant lied on their back for three minutes and so resting HR, resting arterial pressure, biochemical 8h fast variant (triglycerides, glucose, total cholesterol) anthropometry by measuring body mass, height and neck, waist and hip circumferences.

In order to evaluate PF were measured BMI, flexibility, abdominal power and aerobic capacity. Flexibility was evaluated by the sitting on the floor without shoes, extended and united knees, put feet in contact to the box and with both hands together and extended elbows the participants were stimulated to reach longer enough, bouncing the body towards. It was accounted for at a distance (cm) where the fingertips reached, since the position was remained for 5 seconds.

In the abdominal test, the participant should lay back on a mattress, 90° knees flex, feet on the floor and fixed by the evaluator and with the arms crossed on the chest. The participants

were stimulated to realize the maximum repetitions per minute, flexing the trunk in a way the elbows could touch thigh and go back down. Only correct executed repetitions were recorded (spoken loudly).

On the aerobic capacity, a proxy was used to measure throughout static walk test: on the sign, the participant initiated static walking (no running) completing as many knee elevations as possible within two minutes. The minimum knee high for each participant was recorded by the medium level between the patella and the anterosuperior iliac spine. On this study, the HR was verified right after finishing the test. The participants were told when past 1 minute test and 30 seconds befor the end time. The evaluator demonstrated all test prior the participant execution.

Instruments

Body mass, height and circumferences anthropometric measures were recorded, respectively, by using a digital Filizola scale (100g precision), a flexible metallic tape steel stadiometer (cm) and a Sanny centimeters scale tape. These measurements made possible calculate BMI, neck circumference (NC), WC and WHR.

The biochemical variants were analyzed by using the monitor Accurent Plus Roche.

The Sit and Reach test was used to achieve flexibility results. A centimeter scaled box with a centimeter precision was used as suggested in Wells & Dillon (1952). The one minute abdominal resistance was conducted by the AAHPERD recommendations (Huniscker & Reiff, 1976).

All of the tests were realized at the Integrated Health Center at UNIFANOR. In order to make easier the analysis of low aptitude people proportion between genders, related variant categories were grouped.

Statistical analysis

The results are expressed in averages, standard deviation and percentage values, when needed. Kolmogorov-Smirnov test was conducted to normality evaluation and Levene test to equal in variant evaluation. The Fisher test was conducted in categorical variables. The ANOVA test was conducted when comparing more than two groups with normal distribution

and equal variation and the Kruskall-Wallis test was conducted to non-parametric variant. For two group comparison Student t test or Mann-Whitney was conducted, when suitable. The 95% significance level was stablished. Data run was realized on Statistical Package for the Social Sciences (SPSS) for Windows.

Results

The descriptive data sample can be observed in Table 1 (n= 90). Results are shown in biochemical, anthropometric and hemodynamic analysis. The nutritional state analysis pointed to a 23.2 ± 4.1 kg/m^2 BMI average.

The anthropometric evaluation identified an average of 77cm in NC. That considers out of risk for metabolic disease for both genders, and a 0.7 on the WHR. The values for NC were in 34.3cm average, around normal range considering gender and BMI.

Biochemical analysis pointed to averages values of 177mg/dl in cholesterol, 65.3 mg/dl in glycemic, and 132mg/dl in triglycerides, all in reference range. The aptitude capacity was conducted throughout measuring levels of abdominal power and sit and reach test. The results are 22.8 reps and 24cm respectively.

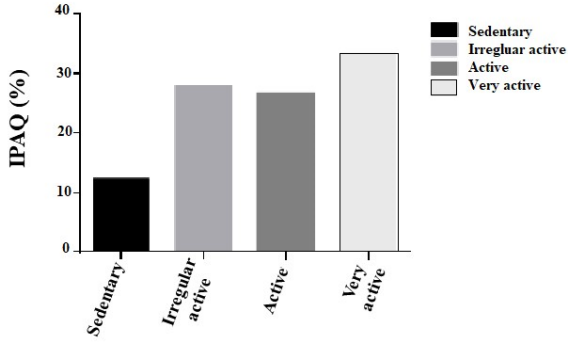
Table 1 - Data analysis of health and physical fitness levels in College students

Variants	Average	Standart Deviation
Biochemical analysis		
Cholesterol	177.0	29.9
Blood glucose	65.2	15.9
Triglycerides	132.0	64.2
Anthropometric analysis		
BMI	23.2	41
WC	77.0	10.1
WHR	0.77	0.07
NC	34.3	3.2
Hemodinamic analysis		
Sistolic AP	105.5	10.3
Oximetry test	97.0	2.6
HR test	147.6	22.0
Physical Fitness evaluation		
Abdominal	22.8	8.2
Flexibility	24.0	11.2

Source: Prepared by the authors, 2018.
Notes: BMI: body mass index (kg/cm^2); WC: Wais Circunference (cm); WHR: Waist-Hip Ratio; NC: Neck Circunference (cm); AP: Arterial Pressure (mmHg); HR rate: heart rate test (bpm).

The physical activity levels were observed that 11 sedentary (12.2%), 25 (27.8%) irregular active, 24 (26.7%) active and 30 (33.3%) very active. The percentage data are shown next in figure 1.

Figure 1 - Physical Activity levels analysis (n=90)



Source: Prepared by the authors, 2018.

After ANOVA test conducted with the IPAQ values as dependent factor, Bonferroni test pointed to a difference between sedentary and physically active students (p= 0.005). No other significant difference was found in the other data.

Table 2 - Variants analysis (ANOVA) among biochemicals and anthropometric keys and physical fitness components with IPAQ as a dependent factor.

Variants	Square add	Medium square	F	P value
Cholesterol	3174.6	1058.2	1.1	0.32
Blood glucose	1058.4	352.8	1.4	0.21
Triglicerydes	4119.5	1373.1	0.32	0.80
BMI	28.5	9.5	0.54	0.65
WC	162.0	54.0	0.51	0.67
WHR	0.016	0.005	0.87	0.45
NC	11.0	3.68	0.34	0.79
Sistolic AP	1319.2	439.7	4.62	0.005*
Diastolic AP	466.7	155.5	2.2	0.08
Adbominal	21.4	7.15	0.10	0.95
Oximetry Test	18.4	6.1	0.90	0.44
Flexibility	270.7	90.2	0.70	0.55
HR Test	169.8	56.6	0.11	0.95

Notes: BMI: Body Mass Index; WC: Wais Circunference; WHR: Wais Hip Realtion; NC: Neck Circunference; AP: Arterial Pressure; HR: Heart Rate. *p<0.0005

After a gender analysis, despite the BMI similarity (p= 0.52), abdominal parametric values was larger in men (84.1 ± 10.3) than in women (74.7 ± 9.0) (p= 0.000). The same behave was observed on the 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) (Table 3).

Systolic and Diastolic arterial Pressure (SAP/DAP) in male students was observed higher than in female students SAP (113.3 ± 12.3 vs. 103.0 ± 8.2; p= 0.000) and DAP (76.6 ± 10.6 vs. 72.4 ± 7.5; p= 0.04).

About the Physical Activity levels, was observed a similarity between genders with no significant statistical difference (p= 0.99).

Table 3 - Gender comparison

Variants	Male N=23(25.6%)	Female N=67(74.4%)	P values
Biochemical analysis			
Cholesterol. (average±SD)	167.2(±25.6)	180.4(±30.7)	[1]0.06
Glycemia (average±SD)	66.2(±15.3)	64.9(±16.2)	[1]0.73
Triglicerydes (average±SD)	152.0(±77.6)	125.2(±57.9)	[1]0.08
Anthropometric analysis			
BMI (Kg/m2). (average±SD)	23.7(±3.6)	23.1(±4.3)	[1]0.52
Waist Circunference (cm)	84.1(±10.3)	74.7(±9.0)	[1]0.000**
WHR (average±SD)	0.83(±0.1)	0.74(±0.05)	[1]0.000**
NC (average±SD)	38.5(±2.1)	33.0(±2.2)	[1]0.000**
Physical Activity levels			
IPAQ. n. (%)			
Sedentary	3(14.3%)	8(12.9%)	
Irregular Active	6(28.6%)	19(30.6%)	[2]0.99
Active	6(28.6%)	18(29%)	
Very Active	6(28.6%)	17(27.4%)	
Biochemical analysis			
arterial Pressure (sistolic)	113.3(±12.3)	103.0(8.2)	[1]0.000**
arterial Pressure (diatolic)	76.6(±10.6)	72.4(±7.5)	[1]0.04*
Heart Rate	81.8(±13.8)	82.6(12.3)	[1]0.80
Oximetry	97.7(±0.09)	97.8(±1.3)	[1]0.89
Physical Fitness Evaluation			
Abdominal	27.3(±6.5)	21.3(±8.2)	[1]0.002**
Flexibility	21.0(±9.9)	25.0(±11.5)	[1]0.14

Notes: BMI - Body Mass Index; NC - Neck Circunference; [1]T Test; [2]ANOVA test.

All participants were conducted to a binary correlation (n=90). Referring to the biochemical analysis, a positive relation was observed between cholesterol and triglycerides levels (R= 0.28; p= 0.006). A positive relation was also verified in triglycerides and NC values (R= 0.20; p= 0.05). As expected, anthropometric analysis showed a positive and significant relation (p< 0.05). Interestingly, the studied anthropometric variant (WC, BMI, NC and WHR) carried out a positive relation to SAP (p< 0.05) on the other hand diastolic arterial pressure did not correlate to these variant (p> 0.05). The behavior of the HR test was linear with the anthropometric variables (WC, BMI and NC) (p< 0.05).

Analyzing oximetry and anthropometric and biochemical variant values with physical activity components, was observed a positive relation between oximetry and WHR (R= 0.35; p= 0.001).

On the end, it was aimed to analyze lipid profile, power level, flexibility and WC related in a group analysis. After verification, three clusters were determined, first with 40 observations (46%), second with 35 (40.2%) and a third one with 12 (13.8%). The clusters presentation are organized in order of variant importance to clusters definition. Triglycerides was the variant most important to the clusters definition in this population. Consequently, the following variants are shown in the table below according to their force in order to enter the clusters. Abdominal and flexibility variants has shown the same force in order to enter the clusters (Table 4).

Table 4 - Correlation between anthropometric, biochemical and hemodynamic variants and physical fitness components.

Variants		CT	TG	WC	NC	ABS	O2PS_T	FLEX	GLy	BMI	WHR	S_AP	HR_T
CT	R	1	0.286	-0.092	-0.174	-0.129	-0.136	0.006	0.000	0.023	-0.077	0.018	-0.119
	P		0.006*	0.390	0.103	0.228	0.201	0.958	0.997	0.832	0.473	0.872	0.266
TG	R		1	0.147	0.201	0.018	-0.093	0.016	-0.112	0.132	0.099	0.066	0.014
	P			0.170	0.05*	0.865	0.381	0.881	0.293	0.216	0.355	0.548	0.895
WC	R			1	0.795	0.172	-0.186	0.041	-0.012	0.781	0.770	0.391	0.228
	P				0.000*	0.109	0.081	0.706	0.913	0.000*	0.000*	0.000	0.032*
NC	R				1	0.357	-0.106	-0.062	0.016	0.595	0.599	0.433	0.202
	P					0.001*	0.323	0.564	0.883	0.000*	0.000*	0.000*	0.05*
ABS	R					1	-0.025	0.193	0.061	0.066	0.171	0.201	0.232
	P						0.817	0.072	0.573	0.536	0.111	0.065	0.028*
02PS_T	R						1	0.021	0.008	0.065	0.357	-0.131	0.009
	P							0.844	0.944	0.544	0.001*	0.228	0.931
FLEX	R							1	0.147	0.110	0.021	0.002	0.251
	P								0.170	0.304	0.847	0.983	0.01*
GLY	R								1	0.047	-0.050	0.363	0.143
	P									0.660	0.643	0.001*	0.178
BMI	R									1	0.330	0.299	0.251
	P										0.002*	0.005*	0.01*
WHR	R										1	0.382	0.142
	P											0.000*	0.185
.S_AP	R											1	0.166
	P												0.126
HR_T	R												1
	P												

Notes: CT- cholesterol; TG- triglycerides; WC- waist circunference; NC- neck circunference; ABS- abdominal; FLEX- flexibility; BMI- Body Mass Index; S_AP- sistolic arterial pressure; HR_T- heart rate test.

Discussion

In the present study, the health standards of young Brazilian university students were evaluated. For this purpose, biochemical, anthropometric and hemodynamics parameters were used such as a PF evaluation. It was shown that a great number of the participants are physically active and that the PF and the hemodynamic variant levels shows appropriated levels to the studied population, being stablished into the normality patterns guided by the Brazilian Cardiology Society (Faludi et al, 2017).

The IPAQ was held to assess physical activity levels, being this questionnaire a gold standard model for health studies. In this moderate intensity physical activity context, normally realized during the days, with a HR between 40-60% of the maximum, are associated a reduction in the coronary risk (Hu et al, 2007), Cerebral vascular accident (Bauman, 2004; Hu et al, 2000) and insulin resistance (Hasson, Freedson & Braun, 2006). These benefits can be related to a reduction in arterial pressure, body weight, blood cholesterol and an improvement in the glucose tolerance (Lakka & Laaksonen, 2007).

Physical activity have been presenting an immeasurable value for maintaining and improving population health (Warburton & Bredin, 2017) especially in young population (Hills, Dengel & Lubans, 2015; Herting & Chu, 2017). Among all individuals needs of a good QF are good cardiorespiratory conditions and a good skeletal muscle use of oxygen. The Physical activity, which is defined as a body movement that results in energy expenditure, is basic to this process (Prae et al, 2008).

However, our findings are away from another one in which there were a great variation in PI prevalence among young Brazilian college students (Oliveira, Gordia, Quadros & Campos, 2014). Another study conducted with 280 health and biological students on the courses of Physical Education, Pharmacy and Biochemical, Dentistry and Biological Science, pointed towards only the Physical Education students being physically active during all course long (Silva et al, 2007).

Another study evaluated leisure physical activity and entering university students displacement. The authors determined that Physical Education and Agricultural Engineering students showed higher diary physical activity levels (Mielke et al, 2010). These appointments point to a benefic relationship among the graduation course and a development of a higher physically active life, with better life index.

In this respect, obesity control and prevention are fundamental to reduce cardiac dysfunction, hypertension, type 2 diabetes and dyslipidemia risks. However the bad obesity effects on health are caused by the body fat excess, obesity levels are generally defined by anthropometric instruments like: BMI, WC, WHR and/or NC, what does not distinguish the specific components of thin or fat tissue in human body (Pires, Mussi, Cerqueira, Pitanga & Silva, 2013).

There are reports of high prevalence of elevated WC and high or very high risk due to the WHR in college students, as well as the body weight excess independently of the graduation year (Pires & Mussi, 2016). A study with 455 college students through the years 2011-2014 had identified a + 4.2cm in WC, + 0.8kg/m^2 BMI and -25 minutes moderate to vigorous physical activity (MVPA) practice on female students and + 4cm WC, + 0.7kg/m^2 BMI and - 33min MVPA practice on male students during four years graduation course (Gasparotto, Pacífico, Camargo & Campos, 2017).

The WC is commonly used as one of the obesity diagnosis criteria. On this, the International Diabetes Federation provided a metabolic syndrome definition for young people, in which the WC is a big importance component for this population health (Hoffman, Wang, Gallagher & Heymsfield, 2005). Then, it is appropriated to consider the observed differences in the studied variants and the obesity parameters in youth and the potential need to explain it.

Despite have not been identified levels of obesity in this study population, there were relationship in anthropometric variants and SAP. Similar results had been found by Martins et al (2010) and Gasparotto et al (2017) that the authors occurred an elevation in the average of the arterial pressure got high with the elevation in BMI and WC.

On this view, we aimed to comprehend the anthropometric variants influence on the health variants analyzed. As expected, in this study male participants have shown high anthropometric levels when compared to female ones. This is reinforced by previous studies (Loch, Konrad, dos Santos, & Nahas, 2006; Corseuil & Petroski, 2010).

A great relevant consideration have to take place, the studied groups ethnicity. It was shown that ethnicity characteristics influenced the obesity patterns of measurements and its comorbidities association. For example, in white and afro-american BMI and WC were positively related to diabetes, hypertension and your association. In Hispanic ones, only BMI was related to hypertension, and in the Asian ones WHR was not a significant diabetes, hypertension and other comorbidities predictor. The authors suggest that the BMI is not a

universal informative and confirm that WC and derivatives are better suitable measure for universal usage (Chiolero, Paradis, Maximova, Burnier & Bovet, 2013; Rangel-Baltazar & Villalpando, 2014; Tarleton, Smith, Zhang, Kuo, 2014). In this study, there were no ethnicity control on the students what could lead to difficult in understanding some results.

Anthropometric measurements are important, they are related to comorbidities and metabolic dysfunction. Anthropometric parameters are understood to be of a great value in clinics area. Several definition on cardiometabolic alterations in adult have a clinically abdominal obesity measure (Talerton, Smith, Zhang, Kuo, 2014).

In our study, the anthropometric variants (WC, NC, BMI) were positively related to SAP and HR during the test. Medrano et al (2017) have identified WC is one of the greatest predictors for health diagnosis in teenagers. These results also suggest that high cardiorespiratory fitness can produce protective effect in teenagers with high levels of WC. Physical exercise programs focused on the improvement of CF and on the abdominal fat decrease could be a good alternative in treatment and prevention on the disease in the teenagers and young adults (Medrano et al, 2017).

Similar results are shown in other populations. Low VO_{2max} level is associated to a development of the Metabolic Syndrome in adult women (Kelley et al, 2018). There are reports that maintaining high CF levels by regular physical activity practice during pre-mid age diminishes the occurrence of obesity related diseases, and it helps to maintain telomere length, what is a cellular senescence index (Shin, 2019).

Conclusion

It can be comprehended that there is an increase in the number of studies about adult and elderly physical activity practice, studies conducted in Brazilian college students the results in this subject are still incipient. The college students population play a main role mainly due to the fundamental function of college education. Knowing about the prevalence of the risk factors in NCD among young adults need more elucidation.

The diary physical activity levels presented to be a protection factor to the population. The WC was shown as a great relevance factor in the young college students health control evaluation.

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Study 3. Association between Quality Of Life, Sleepiness, Fatigue and Anthropometric Parameters in young University Students.

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 aims to evaluate the association between cardiovascular risk factors, quality of life, daytime sleepiness, fatigue and anthropometric parameters on university students in Fortaleza/CE, Brazil. This was a descriptive, cross-sectional, correlational study, made through epidemiological assessment in young university students. The results show a negative influence of daytime sleepiness and fatigue in overall quality of life. Functional capacity, component of the quality of life, which represents the ability to perform tasks and activities in their life, and limitations due emotional aspects, could impact in well-being and health of a person. Moreover, excessive daytime sleepiness showed a strong correlation with almost all domains of quality of life. Although volunteers didn't show a poor quality of life, fatigue levels and sleepiness presented as relevant variables. There is a need to comprehend and control these variables aiming to improve students' health and consequently, promoting a 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 main 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 (PAHO,2018). The correlation between the development of CVD and NCCD, particularly in obesity with central fat distribution, has been previously described (Oliveira, Fagundes, Moreira, Trindade & Carvalho, 2010; Mendonça, 2016; Lima, 2018).

Although, these cardiovascular risks were considered particularly important in older adults and elderly, recent studies demonstrated that these risks are also present in young adults (Zeller & Modi, 2006; Dwyer et al., 2009; Carvalho et al., 2015; Dantas, Pinto, De Abreu Freitas & De Medeiros, 2015, George, Tong & Bowman, 2017, Yano et al., 2016). This epidemiological scenario not only shows in a significant reduction in life quality of this, but also represents a burden in health care costs and society (Rocha & Martins, 2017).

Poor quality of life in obese children and teenagers is associated with higher risks for developing disturbs related feeding behavior at the beginning of adulthood, especially in women. In addition, the risk of death in obese adults that were obese during childhood is significantly higher compared to eutrophic adults which presented normal weight during their childhood. The quality of life and psychological well-being are improved as consequence of weight loss (BASOMS, 2016).

Obesity has shown to be associated with a low-grade chronic inflammation, (Ying et al., 2019). Furthermore, islet macrophages also impair the insulin secretory capacity of β-cells, comprising the quality of life (Ying, Fu, Lee & Olefsky, 2019). Another dysfunction associated with obesity is sleeping disorder. Studies associate higher prevalence of sleepiness as one of the main components of Metabolic Syndrome and CVD (Mansur et al., 2015, Rawat et al., 2019; Polido-Arjona et al., 2018). Weight loss has been shown to attenuate the severity of sleeping disorders (Patel & Mehra, 2015).

For children and adults, the hours of night sleep is conversely associated with Body Mass Index (BMI) and obesity in cross-sectional studies, and obesity incidence, in longitudinal studies. In animals, sleep deprivation resulted in hyperplasia, impaired leptin and TSH secretions, increase in ghrelin levels and reduced glucose tolerance. These changes are consistent with chronic sleeping deprivation, which in turn, increases obesity risk (BASOMS, 2016, Pereira et al., 2020)

As consequence, evidences point towards an increased manifestation of fatigue associated with sleeping deprivation and obesity in young university student, which are correlated with years of study and BMI (Hershner & Chervin, 2014; Maugeri et al., 2018; Amaducci, Mota, & Pimenta, 2010).

Although the number of studies with university students are limited, those who previously assessed these parameters reported the presence of fatigue, which might impact learning, quality of life and professional graduation. Studies regarding stress in undergraduate

students demonstrated evidences of psychological stress, sleeping disorders, and others physically expressed symptoms (Whittier et al., 2014; Núñez, Perillan, Arguelles & Diaz, 2019; Li & Hasson, 2020).

Thus, considering the relation between quality of life, sleep deprivation, obesity, fatigue, CVD, and the fact that university students are a population that exhibit a lifestyle inclined to unhealthy habits, it becomes important to investigate the relation of previously mentioned variables with young university students.

Therefore, this study aims 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

Participants were recruited from the general population through flyer advertisements and advertisements at the Centro Universitário Fanor|Wyden. The data was acquired during the second semester of 2018. The present study focus on the age range of students that who mostly are present on university centers. The research team subsequently phoned the volunteers verify their interest and to check if they 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 voluntarily participate in the study. After written consent, three trained researchers conduct all protocols.

Initially, 98 students who volunteered to participate. However, 8 did not participate in the experiment (due to illness or forgetting the appointment). For this sample, it was randomly chosen 90 young university students, composed by 23 males (25,6%) and 67 females (74,4%). The research protocol was approved by 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 of this research.

Instruments

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

To assess physical activity levels, it was used the short version of International Physical Activity Questionnaire (IPAQ), developed by World Health Organization in 1998 to acquire worldwide data regarding physical activity. IPAQ has been previously used to acquire data regarding physical levels in university students in Brazil and in other countries (Melo et al., 2016; Fagaras, Radu, Vanvu, 2015). IPAQ questionnaire classifies the respondents as follow: 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 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. Global score ranges from 0 to 24 points. Scores above 10 indicated excessive diurnal sleepiness (Bertolazi et al., 2009).

To analyze fatigue symptoms, it was used the Fatigue Severity Scale (FSS) questionnaire. FSS contains nine affirmative sentences where participants sign a score ranging 1 to 7 regarding how that assertion fits his present condition. Number 1 implies that the participant strongly disagrees with the assertion, and 7 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 have age equal or superior to 18 years, been regularly enrolled to a university course and do not have any kind of condition that limits the collection of anthropometric data. Recruitment of volunteers was made by advertising the study in classrooms and in other locations of the university

Anthropometric assessment and questionnaires application were done 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 Levene test to verify homogeneity of variances. Fisher's test was used for comparisons between category variables in this study. Yates' correction test was used to compare genders. To compare more than two groups, ANOVA was used for data with normal distribution and homogeneity of variances and Kruskall-Wallis test to non-parametric variables. To compare two groups, Student's T test or Mann-Whitney test were used. Multiple linear regression was also used in this study. Significance level was determined as 95%. Data were plotted and analyzed in statistical software SPSS® for Windows (SPSS21).

Results

In the present study, students BMI ranged from 16,8 to 39,0 (23,2±4,1) kg/m^2. Our data showed that waist circumference values varied from 64,0 to 105,0 (77,0±10,1) cm while aist-hip ratio ranged from 0,65 o 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).

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.

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.)

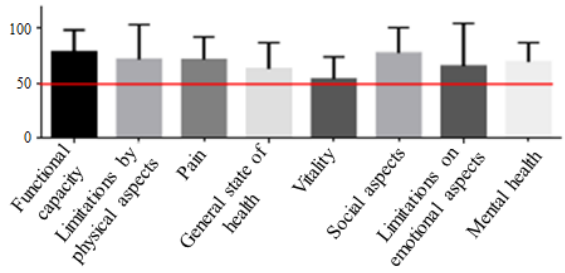
Table 2 Comparison of Anthropometric and physical activity levels between genders.

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)	[1]0.52
WC (cm)	84.1(±10.3)	74.7(±9.0)	[1]0.000**
WHR (Mean±SD)	0.83(±0.1)	0.74(±0.05)	[1]0.000**
NC (Mean±SD)	38.5(±2.1)	33.0(±2.2)	[1]0.000**
Physical activity levels IPAQ. n. (%)			
Sedentary	3(14.3%)	8(12.9%)	
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

Although all quality of life domains demonstrated scores above 50 points, sub item "vitality" showed a lower score (Figure 1).

Figure 1 Domains of the quality of life questionnaire SF-36.



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

A 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 emotional aspects (p=0,02, r=-,24) and mental health (p=0,000, r=-,36). Limitations due physical aspects and pain were not correlated with excessive daytime sleepiness (Table 3.)

Table 3 Linear regression between daytime sleepiness and quality of life

		FC	LPA	PN	GH	VIT	SA	LEA	MH
Daytime sleepiness	Pearson's	-0.251	-0.203	-0.082	-0.356**	-0.302**	-0.278**	-0.241*	-0.366**
	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 emotional aspects; MH – Mental Health; PN – Pain.

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

Table 4 Linear regression between fatigue and quality of life

	Coefficient			t	p value
	B	SD	Beta		
(Constant)	35.016	6.443		5.434	0.000
FC	-0.029	0.078	-0.050	-0.369	0.71
LPA	-0.001	0.044	-0.003	-0.023	0.93
PN	-0.099	0.072	-0.180	-1.365	0.13
GH	-0.055	0.077	-0.116	-0.716	0.42
VIT	0.053	0.098	0.094	0.544	0.51
AS	0.102	0.078	0.210	1.313	0.19
LEA	-0.080	0.040	-0.276	-2.029	0.04*
MH	0.007	0.119	0.011	0.058	0.95

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

Discussion

The main results of this study indicate a negative influence of daytime sleepiness and fatigue in quality of life. These data show that functional capacity, component of life quality which represents the ability to perform tasks and activities in their life, and limitations due

emotional aspects, could impact in well-being and health of a person. Furthermore, excessive daytime sleepiness demonstrates a strong negative association with almost all domains in quality of life questionnaire.

Daytime sleepiness and poor sleep quality is associated with alterations in biological clock and thus, circadian cycle. Suprachiasmatic nucleus may present alterations and abnormal function which impacts serum glucose, cortisol and blood pressure (Froy, 2011; Kreier et al., 2007). The effects of daytime sleepiness are related to glucose metabolism. A study reported that autonomic dysfunction is associated with an increased risk for developing diabetes in young and elderly (Stamatakis & Punjabi, 2010).

To date, there is no consensus regarding 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, it is possible that physical activity improves mood and sociability, which in turn, reduce sleepiness symptoms (Okay, Jackson, Marcinkiewicz, & Papino, 2009).

In the present study, physical activity levels were not correlated with analyzed variables. However, it could be hypothesized that increasing health habits and physical activity levels improves life quality of young university students. Effting et al. (2019) reported that resistance exercise is an important tool to treat obesity, to manage metabolic alterations and to maintain quality of life.

Although we're unable to find alterations in anthropometric measures, the impact of obesity in quality of life is well known. Poor Cardiorespiratory fitness seems to negatively affect cardiovascular risk factors in teenagers, especially regarding excessive weight in both genders and biochemical profile in male, thus, urging for preemptive actions during childhood and teenagehood (Rodrigues; Perez; Carletti; Bissoli; Abreu, 2007).

In addition, reports that hypertension (Carvalho, Siqueira, Sousa & Jardim, 2013), obesity (Poeta, Duarte & Giuliano, 2010), CVD prevalence (Teston et al., 2016), demographic and social economics factors related to health and lifestyle (Ascef et al., 2017) negatively affected quality of life in these patients have been described.

These findings corroborate with other factors that impacted 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 associated to performance in students' academic activities. Although, it seems that these factors were not correlated with university evasion, which was practically non-existent in last decade (Tatjana, Popovic, Tepavcevic, Gazibara & Paunic, 2011; Catunda & Ruiz, 2008).

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

Studies have found symptoms of anxiety, depression, major incidence of fatigue, and poor physical energy among young adults with sleeping problems (Mill, Hoogendijk, Vogelzangs, Dyck, Penninx, 2010; Muler & Guimarães, 2007). Reports found prevalence of moderate/intense fatigue in young university students which, in turn, described moderate/intense impairments in daily activities, showing a correlation between fatigue with the graduation year, body mass index and depression. Academic activities were the main responsible for fatigue (Amaducci, Mota & Pimenta, 2010).

It is expected that young university students to achieve better quality of life and health, however, daytime sleepiness and fatigue are variables that impact both. Moreover, daytime sleepiness and fatigue were also associated with obesity and well-being in young university students (Vgontzas, Bixler & Chrousos, 2006).

It is well established that alterations in circadian cycle might have genetic influence, but it also might be adjusted by daily circumstances such as work, jet lag, among others situations. A previous study has demonstrated a greater sympathetic tone 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, the amount of academic activities and students' schedule should be well observed.

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 in order to promote an improvement in the health of college students and, consequently, have a healthier adult life.

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GENERAL DISCUSSION AND CONCLUSIONS

4

Chapter 4. General Discussion and Conclusions

General Discussion and Conclusions

The present research aimed to investigate and to interpret the relationship between PF levels and cardiovascular health in young college students.

In addition, our study provides new insights regarding the association between variables that make young adult predisposed to cardiovascular disease and points toward PI as a major predictor for this condition.

Taken together, this information represents a warn for students, since there were changes in sleep time, body composition and fatigue, affecting biopsychosocial conditions of these young people, which in turn, impacts their quality of life.

Furthermore, this study alerts to public and private boards to pay attention to students' health, recommending and creating interventions programs involving physical exercises inside the college education institutions as future strategies.

Moreover, it also brings a warning regarding todays childhood lifestyle and their impact in adulthood, since during the main phase of physical, motor and metabolic development is being impaired by poor health habits.

Based on the gathered data during this doctoral process, it was possible to write three articles regarding students' health. Each article is briefly described ahead.

The first article was a systematic review which aimed to analyze the association between PF and CVD risks in young college students. Results show that the young college students present sedentary behavior, low aerobic fitness, high dyslipidemia rates, central obesity, increased arterial pressure levels, characterizing various CVD risk factors.

Although this review suggests the presence of several evidences, they are not consistent due to the lack of the literature regarding this subject. Due to the small number of studies in last 10 years associating young college students and the analyzed indicators, more researches are necessary the clarify this topic.

The second article aimed to evaluate the health levels and its association to PF, to biochemical and hemodynamic variables in young college students. Daily physical activity levels presented as a protective factor in this population, since biochemical and hemodynamic data were at normal range. The knowledge regarding CND risk factors prevalence in young

adults still needs more elucidation. The WC was described as the most relevant factor for evaluating health control in young college students.

The third article proposed to investigate the association between quality of life, daytime excessive sleepiness, fatigue, anthropometry and physical activity among young college students.

In this study, physical activity levels did not influence quality of life, daytime excess sleepiness and fatigue symptoms. No differences were found in physical activity levels, daytime sleepiness, fatigue levels between genders.

Linear regression showed a negative correlation between excessive daytime sleepiness and QL sub items such as functional capacity, health general state, vitality, social aspects, limitations due to emotional aspects and mental health. The fatigue was only influenced emotional aspects of the QL.

The BMI was similar in genders, although WC, WHR and NC in men reached higher results.

Comprehending and controlling these variables are important to promote a better health for young college students and a healthier adult life.

This population, especially from 20 years-old, rarely use medical services nor pay attention to preventive medicine. These young students experience less possibilities of being professional students due to social inequality, paying their own education, living an 8-hour work period, in addition to 4 hours in classrooms, which in turn promotes the increase of PI in this population.

The PI is raising in Brazilian cities, leading to an increase on body fat, in arterial hypertension and hypercholesterolemia, which are the main cardiovascular disease risk factors.

During this thesis, despite researches didn't find significantly validated and rigorous data regarding coronary risk in the studied population, analyzed elements that influence QL have shown important information that serves as a warning to Physical Education scientific community about the importance of providing and promoting physical exercise as a essential element for population.

The lack in the sample willingness was a limiting factor in this research. Participants were assessed during the morning, preceding their daily academic activities.

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Chapter 5. References

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ATTACHMENTS

6

Chapter 6. Attachments

Attachment 1. Consubstantiated Opinion - Ethics Committee

FACULDADE METROPOLITANA DA GRANDE FORTALEZA - FAMETRO

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Aptidão física e saúde cardiovascular em jovens universitários: um estudo transversal

Pesquisador: ROSANE DE ALMEIDA ANDRADE
Área Temática:
Versão: 3
CAAE: 65185717.8.0000.5618
Instituição Proponente: CEUDESP - CENTRO DE EDUCACAO UNIVERSITARIO E DESENVOLVIMENTO
Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 2.089.272

Apresentação do Projeto:
A maior parte das causas do surgimento da hipertensão em jovens universitários tem sido a mudança de estilo de vida ao ingressarem no ensino superior, uma vez que os mesmos, além de se tornarem sedentários mudam seus hábitos alimentares alterando o metabolismo, bem como sua composição corporal, tornam-se sobremassa corporal/obesos. O projeto traz uma temática importante para a saúde púlica uma vez que busca analisar os fatores de risco para o desenvolvimento de problemas cardiovasculares entre jovens.

Objetivo da Pesquisa:
Analisar a relação entre os níveis de aptidão física e a saúde cardiovascular em jovens universitários na cidade de Fortaleza – Ce Brasil no periodo de abril a julho de 2017.

Avaliação dos Riscos e Benefícios:
Os riscos e benefícios, bem como os procedimentos que serão adotados para minimizar os riscos estão claramente descritos.

Comentários e Considerações sobre a Pesquisa:
O método está descrito detalhadamente, o instrumento de coleta de dados está presente,foi realizado cálculo amostral.

Endereço: R. Conselheiro Estelita, 500
Bairro: Centro **CEP:** 60.010-260
UF: CE **Município:** FORTALEZA
Telefone: (85)3206-6417 **Fax:** (85)3206-6417 **E-mail:** cep@fametro.com.br

Considerações sobre os Termos de apresentação obrigatória:

Folha de rosto - OK

TCLE - OK

Cronograma -Ok

Orçamento -Ok

Carta de anuência- OK

Recomendações:

-Retirar a logomarca da Fametro do TCLE, Orçamento, Cronograma,Carta de anuência, Brochura do Projeto de Pesquisa. Esses documentos quando se julgar necessário constar logomarca deve conter a logomarca da instituição a qual a pesquisadora é vinculada e expressamente para o TCLE o endereço e contatos do Comitê de Ética ao qual o projeto foi submetido, como recomenda a resolução CONEP 466/2012.

Conclusões ou Pendências e Lista de Inadequações:

Considerando as resoluções das pendências do Parecer 2.030.024, e que o projeto de pesquisa atende a todas as recomendações da Resolução CNS nº 466/2012, o mesmo está aprovado pelo CEP-FAMETRO

Considerações Finais a critério do CEP:

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_787766.pdf	03/05/2017 18:11:51		Aceito
Projeto Detalhado / Brochura Investigador	PROJETO_PESQUISA_COMITE_ROSANE.doc	27/04/2017 19:28:45	ROSANE DE ALMEIDA ANDRADE	Aceito
Orçamento	_ORCAMENTO_ROSANE.docx	27/04/2017 19:26:54	ROSANE DE ALMEIDA ANDRADE	Aceito
Cronograma	CRONOGRAMA_ROSANE.docx	27/04/2017 19:25:35	ROSANE DE ALMEIDA ANDRADE	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_ROSANE_2.docx	27/04/2017 19:24:21	ROSANE DE ALMEIDA ANDRADE	Aceito
Declaração de Instituição e Infraestrutura	AUTORIZACAO_DA_INSTITUICAO_FGF_ROSANE_pdf.pdf	27/04/2017 19:22:14	ROSANE DE ALMEIDA ANDRADE	Aceito

Endereço: R. Conselheiro Estelita, 500
Bairro: Centro **CEP:** 60.010-260
UF: CE **Município:** FORTALEZA
Telefone: (85)3206-6417 **Fax:** (85)3206-6417 **E-mail:** cep@fametro.com.br

Continuação do Parecer: 2.089.272

Outros	_TERMO_DE_COMPROMISSO_PARA_UTILIZACAO_DE_DADOS_ROSANE.d	24/02/2017 13:26:38	ROSANE DE ALMEIDA ANDRADE	Aceito
Outros	_CARTA_APRECIACAO_CEP_UFC__ROSANE.docx	24/02/2017 13:20:43	ROSANE DE ALMEIDA ANDRADE	Aceito
Declaração de Pesquisadores	_DECLARACAO_PESQUISADORES_ROSANE.docx	24/02/2017 13:15:25	ROSANE DE ALMEIDA ANDRADE	Aceito
Folha de Rosto	FOLHA_DE_ROSTO_ROSANE.pdf	24/02/2017 13:07:40	ROSANE DE ALMEIDA ANDRADE	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

FORTALEZA, 30 de Maio de 2017

Assinado por:
Germana Costa Paixão
(Coordenador)

Endereço: R. Conselheiro Estelita, 500
Bairro: Centro **CEP:** 60.010-260
UF: CE **Município:** FORTALEZA
Telefone: (85)3206-6417 **Fax:** (85)3206-6417 **E-mail:** cep@fametro.com.br

Attachment 2. Individual Term of Free and Informed Consent

Termo de Consentimento Livre e Esclarescido

PESQUISADORA: Rosane de Almeida Andrade

Sou Profª Rosane de Almeida Andrade, portadora do CPF:80216390320, pesquisadora e professora universitária estou desenvolvendo uma linha de pesquisa na área de investigação da aptidão física e saúde , cujo o tema Aptidão física e saúde cardiovaascular em jovens universitários: um estudo transversal.

Venho por meio desta, solicitar a sua participação nesta pesquisa, onde se realizará a aplicação de uma bateria de testes no seu ambiente de estudos.

Segue abaixo algumas informações para maiores esclarecimentos sobre essa pesquisa.

O PORQUÊ DESTA PESQUISA?

Essa pesquisa nasce da necessidade de perceber que os jovens universitários estão cada vez mais sedentários, com uma composição corporal e medidas antropométricas em níveis de sobremassa corporal e/ou obesidade, bem como alterações para zona de risco na pressão arterial e nos marcadores bioquímicos; essas consequências da inaptidão física provoca, assim, riscos de doenças cardiovasculares.

QUAIS OS OBJETIVOS DESSA PESQUISA?

Analisar a relação entre os níveis de aptidão física e a saúde cardiovascular em jovens universitários na Faculdade da Grande Fortaleza no período de abril a julho de 2017

1. Adaptar e validar o PROESP – Projeto Esporte Brasil para a faixa etária joven adulta.
2. Relacionar os níveis de atividade física habitual e aptidão física para a saúde em jovens universitários;
3. Relacionar os níveis de aptidão física e características antropométricas e valores da composição corporal em jovens universitários;
4. Relacionar níveis de aptidão física e valores de tensão arterial em jovens universitários;
5. Relacionar níveis de aptidão física e lipídios sanguíneos em jovens universitários;

COMO SERÁ FEITA ESSA PESQUISA?

Para realização desta pesquisa será levada em consideração a prática preconizada no Brasil em 1996, através da Resolução 466/12, que trata da pesquisa envolvendo seres humanos, a qual atende ao princípio ético de autonomia, principalmente no que se refere ao consentimento e esclarecimento aos participantes da pesquisa (BRASIL, 1996).

Em conformidade com a resolução supracitada, ressaltado que em hipótese alguma será divulgado nesta pesquisa o nome das pessoas envolvidas. Os dados somente serão coletados após a assinatura do Termo de Consentimento Livre e Esclarecido – TCLE (Apêndice A).

Procedimentos e etapas para a coleta dos dados

Inicialmente, conduzir-se-á o projeto ao SISNEP; após apreciação favorável deste, será dado início às visitas as Instituições de ensino Superior de Fortaleza para a provação dos projetos em seus estabelecimentos e assim a autorização para a realização da pesquisa.

Paralelamente às visitas, será realizado treinamento com a equipe de avaliação. A coleta dos testes físicos bem como perimetrias e pressão arterial serão feitas pela pesquisadora Rosane de Almeida Andrade e uma equipe devidamente treinada para realizar a coleta dos dados.

Os universitários serão avaliados em duas etapas:

1ª ETAPA

- Assinatura do TCLE;
- Mensuração da pressão arterial;
- Composição corporal;
- Perimetria;
- IMC – índice de massa corporal;
- Coleta sanguínea;
- Aplicação dos questionários;

2º ETAPA

- Aplicação da bateria de testes similar ao PROESP

Os acadêmicos serão avaliados de acordo com os protocolos dos testes. Cada participante será informando dos procedimentos adotados durantes os testes e sua relevância em relação ao estudo e sua importância em relação às suas condições fisicas. Cada participante receberá um formulário de consentimento para sua participação nas avaliações, que deverá ser de forma voluntária, no qual também permitirá o uso dos dados coletados para fins da pesquisa. Os questionários referem-se ao nível de atividade fisica habitual, sócioeconômico.

Para avaliação da composição coropral (os universitários ficaram sem os sapatos e com roupa leve que será orientado previamente), serão mensurados massa corporal corporal total, estatura, percentual de Gordura - %G, IMC e perimetria do abdômen.

Será realizada uma coleta sanguinea para análise da glicose, triglicerídeos, colesterol LDL- Lipoproteina de baixa densidade e HDL – Lipoproteina de alta intensidade.

Logo mais abaixo estarão descritos todas as equações utilizadas junto às descrições dos testes.

POSSÍVEIS DESCONFORTOS

A adesão à pesquisa dos universitários em participar, a assiduidade das universitários em todas as etapas da pesquisa e testes previamente agendadas junto à IES, são dificuldades que poderão comprometer o alcance dos resultados esperados.

Como um dos testes da pesquisa perfa-se com gesto motor, devido a aplicação dos testes de coordenação motora, pode ocorrer que, durante e após os mesmos, haja:

- Fadiga muscular das estruturas envolvidas na pesquisa;
- Entorce de algumas articulações, principalmente a do tornozelo devido ao salto realizado.
- Quedas devido a desequilibrio durante os testes.

O objetivo da pesquisa não é fomentar uma competição entre os participantes, mas como serão realizados testes, pode existir uma competição natural entre eles e algum participante pode se sentir frustrado com resultado, acarretando assim possíveis traumas psicológicos.

OBS: qualquer outra eventualidade acidental com o participante, prontamente terá um carro à disposição para levá-lo à solução que for necessária, seja para casa ou a um hospital mais próximo, ficando de total responsabilidade do pesquisador todos os custos dos procedimentos com o participante.

BENEFÍCIOS ESPERADOS

Como todos os participantes terão conhecimento do que se trata a pesquisa, espera-se que haja um envolvimento dos mesmos, para uma reflexão a medida de que os dados estejam sendo coletados, ou seja, supomos que uma participante ao se comparar com o resultado do colega se pergunte por que eu não consegui também? E a partir dessa resposta, poderemos conversar sobre hábitos saudáveis e assim contribuir para sua melhoria de estilo de vida e,como consequência, quem sabe de sua família.

Para a comunidade cientifica, de uma forma geral, espera-se que ao concluir essa pesquisa, tenham-se dados relevantes para mostrar o quão é significativa a prática de atividade fisica regular e hábitos saudáveis na vida das pessoas.

ESCLARECIMENTOS GERAIS

Todos os dados coletados, as análises, conclusões e possíveis recomendações serão disponibilizadas para universidade ao término do estudo.

É assegurado aos envolvidos neste processo de pesquisa total sigilo e não exposição de imagem, uma vez que tal ação contraria as condutas éticas da pesquisa cientifica. Será utilizado o nome do participante somente durante a coleta dos dados, para que os mesmos não sejam tratados por números nesse processo, logo após todos serão numerados dentro de uma planilha.

Ao final desta carta seguirão as formas de contato diretas com a responsável desta pesquisa que estará à disposição para atendê-lo em todas as etapas deste procedimento.

Fica aqui totalmente esclarecido que a participação nessa pesquisa se fará de forma voluntária e sob autorização dos envolvidos nela, e que a qualquer momento o participante pode se recusar a sair da pesquisa seja por qual for o motivo sem que tenha algum dano ao mesmo.

A colaboração, para realização desta pesquisa, será de uma incomensurável importância para a comunidade científica na área da educação física, saúde e educação, pois permitirá que se tenham mais um suporte científico para elaboração de estratégias didáticas e preventivas, para a educação formativa da conduta de futuros profissionais e com isso, jovens melhores informados sobre o aspecto de suas saúde e aptidão,bem como ter mais um instrumento de dados científicos para os profissionais que desempenham uma função importante na formação acadêmica dos participantes.

MAIORES ESCLARECIMENTOS

- Responsável pela pesquisa: Profª Rosane de Almeida Andrade
  Endereço: rua 03, 460ª Parque Santana Mondubim CEP: 60767-630
  Contatos: (85)88476850 ou (85)99510331
  E-mail: roandradeef@yahoo.com.br

- CEP – Comitê de Ètica em Pesquisa

Certa de sua atenção e seu interesse, atenciosamente.

Rosane de Almeida Andrade

TERMO PÓS-ESCLARECIDO

Pelo presente instrumento que atende às exigências legais, o Sr. (a) _____, portador(a) da cédula de identidade _____, após leitura minuciosa do TCLE, devidamente explicada pelos pesquisadores, ciente dos serviços e procedimentos aos quais será submetido, não restando quaisquer dúvidas a respeito do lido e explicado, firma seu CONSENTIMENTO LIVRE E ESCLARECIDO em participar da pesquisa proposta.

E, por estarem de acordo, assinam o presente termo.

Fortaleza-Ce., _____ de _____ de _____.

_____
Assinatura do pesquisado ou Representante Legal

_____
Rosane de Almeida Andrade

Attachment 3. Consent Informed

CENTRO UNIVERSITÁRIO DeVry Brasil | UniFanor

Centro Universitário UniFanor

DECLARAÇÃO DE CONCORDÂNCIA

UnifanorDeVry, declara para os devidos fins, que concorda em participar do projeto de pesquisa intitulado "**Aptidão fisica e saúde cardiovascular em jovens universitários: um estudo transversal**" que tem como pesquisadora principal, **Rosane de Almeida Andrade**, que desenvolverá o projeto supracitado de acordo com preceitos éticos de pesquisa, pautados na Resolução 466/12 do Conselho Nacional de Saúde.

Fortaleza, 24 de fevereiro de 2017.

Rosane de Almeida Andrade

Pesquisadora Principal

Humberto Barroso da Fonseca

Diretor Regional

Humberto Barroso da Fonseca
Diretor Regional
Adtalem Educacional do Brasil

Attachment 4. International Physical Activity Questionnaire

Nome:_____Data:___/__/____
Idade : _____ Sexo: F ( ) M ( )

As perguntas estão relacionadas ao tempo que você gasta fazendo atividade física na ÚLTIMA semana. As perguntas incluem as atividades que você faz no trabalho, para ir de um lugar a outro, por lazer, por esporte, por exercício ou como parte das suas atividades em casa ou no jardim. Suas respostas são MUITO importantes. Por favor responda cada questão mesmo que considere que não seja ativo.

Obrigado pela sua participação!

Para responder as questões lembre que: ¾ atividades físicas VIGOROSAS são aquelas que precisam de um grande esforço físico e que fazem respirar MUITO mais forte que o normal ¾ atividades físicas MODERADAS são aquelas que precisam de algum esforço físico e que fazem respirar UM POUCO mais forte que o normal Para responder as perguntas pense somente nas atividades que você realiza por pelo menos 10 minutos contínuos de cada vez.

1a Em quantos dias da última semana você CAMINHOU por pelo menos 10 minutos contínuos em casa ou no trabalho, como forma de transporte para ir de um lugar para outro, por lazer, por prazer ou como forma de exercício?

dias _____ por SEMANA ( ) Nenhum

1b Nos dias em que você caminhou por pelo menos 10 minutos contínuos quanto tempo no total você gastou caminhando por dia?

horas: _____ Minutos: _____

2a. Em quantos dias da última semana, você realizou atividades MODERADAS por pelo menos 10 minutos contínuos, como por exemplo pedalar leve na bicicleta, nadar, dançar, fazer ginástica aeróbica leve, jogar vôlei recreativo, carregar pesos leves, fazer serviços domésticos na casa, no quintal ou no jardim como varrer, aspirar, cuidar do jardim, ou qualquer atividade que fez aumentar moderadamente sua respiração ou batimentos do coração (POR FAVOR NÃO INCLUA CAMINHADA)

dias _____ por SEMANA ( ) Nenhum

2b. Nos dias em que você fez essas atividades moderadas por pelo menos 10 minutos contínuos, quanto tempo no total você gastou fazendo essas atividades por dia?

horas: _____ Minutos: _____

3a Em quantos dias da última semana, você realizou atividades VIGOROSAS por pelo menos 10 minutos contínuos, como por exemplo correr, fazer ginástica aeróbica, jogar futebol, pedalar rápido na bicicleta, jogar basquete, fazer serviços domésticos pesados em casa, no quintal ou cavoucar no jardim, carregar pesos elevados ou qualquer atividade que fez aumentar MUITO sua respiração ou batimentos do coração.

dias _____ por SEMANA ( ) Nenhum

3b Nos dias em que você fez essas atividades vigorosas por pelo menos 10 minutos contínuos quanto tempo no total você gastou fazendo essas atividades por dia?

horas: _____ Minutos: _____

Estas últimas questões são sobre o tempo que você permanece sentado todo dia, no trabalho, na escola ou faculdade, em casa e durante seu tempo livre. Isto inclui o tempo sentado estudando, sentado enquanto descansa, fazendo lição de casa visitando um amigo, lendo, sentado ou deitado assistindo TV. Não inclua o tempo gasto sentando durante o transporte em ônibus, trem, metrô ou carro.

4a. Quanto tempo no total você gasta sentado durante um dia de semana?

_____horas ____minutos

4b. Quanto tempo no total você gasta sentado durante em um dia de final de semana?

_____horas ____minutos

Attachment 5. Brazilian Version of the Quality of Life Questionnaire -SF-36

1. Em geral, você diria que sua saúde é:

7. Quanta dor no corpo você teve durante as últimas quatro semanas?

Nenhuma	1
Muito leve	2
Leve	3
Moderada	4
Grave	5
Muito grave	6

8. Durante as últimas 4 semanas quanto a dor interferiu em seu trabalho normal (incluindo tanto o trabalho fora como dentro de casa)?

De maneira nenhuma	1
Um pouco	2
Moderadamente	3
Bastante	4
Extremamente	5

9. Estas questões são como você se sente, e como tudo tem acontecido com você durante as últimas 4 semanas. Para cada questão dê uma resposta que mais se aproxime da maneira como você se sente.

	Todo tempo	A maior parte do tempo	Uma boa parte do tempo	Alguma parte do tempo	Uma pequena parte do tempo	Nunca
A. quanto tempo você tem se sentido cheio de vigor, cheio de vontade, cheio de força?	1	2	3	4	5	6
B. quanto tempo você tem se sentido uma pessoa muito nervosa?	1	2	3	4	5	6
C. Quanto tempo você tem se sentido tão deprimido que nada pode anima lo?	1	2	3	4	5	6
D. Quanto tempo você tem se sentido calmo ou tranqüilo?	1	2	3	4	5	6
E. Quanto tempo você tem se sentido com muita energia?	1	2	3	4	5	6
F. Quanto tempo você tem se sentido desanimado e abatido?	1	2	3	4	5	6
G. Quanto tempo você tem se sentido esgotado?	1	2	3	4	5	6
H. Quanto tempo você tem se sentido uma pessoa feliz?	1	2	3	4	5	6
I. Quanto tempo você tem se sentido cansado?	1	2	3	4	5	6

10. Durante as últimas 4 semanas, quanto de seu tempo a sua saúde física ou problemas emocionais interferiram em suas atividades sociais (como visitar amigos, parentes, etc.)?

Todo o tempo	1
A maior parte do tempo	2
Alguma parte do tempo	3
Uma pequena parte do tempo	4
Nenhuma parte do tempo	5

11. O quanto verdadeiro ou falso é cada uma das afirmações para você?

	Definitiva-mente verdadeiro	A maioria das vezes verdadeiro	Não sei	A maioria das vezes falsa	Definitiva-mente falsa
A. Eu costumo adoecer um pouco mais facilmente que as outras pessoas.	1	2	3	4	5
B. Eu sou tão saudável quanto qualquer pessoa que conheço.	1	2	3	4	5
C. Eu acho que a minha saúde vai piorar.	1	2	3	4	5
D. Minha saúde é excelente.	1	2	3	4	5

Attachment 6. Epworth Sleepiness Scale

Marque um X na opção que a melhor lhe representa. Qual é a "chance" de você "cochilar" ou adormecer nas situações apresentadas a seguir:

Atividades	Nenhuma chance	Pequena chance	Moderada chance	Alta chance
Sentado e lendo				
Vendo televisão				
Sentado em lugar público sem atividades como sala de espera, cinema, teatro e igreja				
Como passageiro de carro, trem ou metro por 1 hora sem parar				
Deitado para descansar à tarde				
Sentado e conversando com alguém				
Sentado após uma refeição sem álcool				
Durante uma prova ou fazendo a tarefa de casa				

Attachment 7. Fatigue Severity Scale

Instruções: "Farei agora 9 afirmações. Você deverá dar uma nota de 1 a 7, onde 1 significa que você discorda completamente e, 7 indica que você concorda plenamente com a afirmação. Lembre-se que estas afirmações referem-se as suas 2 últimas semanas".

AFIRMAÇÕES	NOTA
1. Minha motivação é menor quando eu estou fatigado.	
2. Exercícios me deixam fatigado.	
3. Eu fico facilmente fatigado.	
4. A fadiga interfere em meu desempenho.	
5. A fadiga causa problemas frequentes para mim.	
6. Minha fadiga impede um desempenho físico constante.	
7. A fadiga interfere na execução de certas obrigações e responsabilidades.	
8. A fadiga e um dos três sintomas mais incapacitantes que tenho.	
9. A fadiga interfere em meu trabalho, família ou vida social.	
TOTAL	