

Tiago Rodrigues de Lima
Curriculum Vitae

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Curriculum Vitae

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Produção

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Artigos completos publicados em periódicos

1. GONCALVES, L.; **DE LIMA, TIAGO RODRIGUES**; QUADROS, T.; RECH, C.; SILVA, D. A. S. Counseling on physical activity before and during the Covid-19 pandemic among users of the Brazilian community health promotion program. *Ciência & Saúde Coletiva*. v.30, p.1 - 1, 2025.
2. BIM, M. A.; **LIMA, T. R.**; MARTINS, R.; MIRANDA, C. C.; FERNANDES, R. A.; PELEGRINI, A.. Relationship of skeletal muscle mass, length of sports experience, and sexual maturity with bone density and geometry in adolescent athletes. *JOURNAL OF CLINICAL DENSITOMETRY*. v.28, p.101562, 2025.
3. CASTRO, J. A. C.; **LIMA, T. R.**; SILVA, D. A. S. Health-Related Physical Fitness Evaluation in HIV-Diagnosed Children and Adolescents: A Scoping Review. *International Journal of Environmental Research and Public Health*. v.21, p.541, 2024.
4. GONCALVES, L.; ZANLORENCI, S.; PELEGRINI, A.; **LIMA, T. R.**; SILVA, D. A. S. Individual and joint association between cardiovascular disease risk factors and inadequate lifestyle behaviors in a sample from Brazil. *Arquivos Brasileiros de Cardiologia*. v.121, p.e20240149, 2024.
5. MARCO, J. C. P.; **LIMA, T. R.**; KULKAMP, W.; PINTO, A. A.; PELEGRINI, A.. Secular trends and sociodemographic, biological, and behavioural factors associated with handgrip strength in adolescents in southern Brazil: An allometric approach. *JOURNAL OF SPORTS SCIENCES*., p.1 - 9, 2024.
6. PARMIGIANI DE MARCO, JEAN CARLOS; **RODRIGUES DE LIMA, TIAGO**; DE ARAÚJO PINTO, ANDRÉ; BRAZO-SAYAVERA, JAVIER; PELEGRINI, ANDREIA. 24-h movement guidelines and its association with health-related physical fitness in Brazilian adolescents. *Sports Medicine And Health Science*. v.1, p.1, 2024.
7. SILVA, D. A. S.; **LIMA, T. R.**; GONCALVES, L.. 'Academia da Saúde' Program: mapping evidence from the largest health promotion community program in Brazil. *FRONTIERS IN PUBLIC HEALTH*. v.11, p.1, 2023.
8. SILVA, D. A. S.; **LIMA, T. R.**; LAVIE, C. J.; SUI, X.. Association between cardiorespiratory fitness and low back pain is anxiety-dependent: A prospective cohort study among adults and older adults. *JOURNAL OF SPORTS SCIENCES*., p.1 - 8, 2023.
9. GONCALVES, L.; ZANLORENCI, S.; BORGES, LEANDRO LIMA; **LIMA, T. R.**; SILVA, D. A. S. Body Weight Dissatisfaction and Health Risk Behaviors in Adolescents. *PERCEPTUAL AND MOTOR SKILLS*. v.130, p.340 - 363, 2023.
10. **LIMA, T. R.**; SILVA, D. A. S.. Handgrip strength is not associated with high blood pressure and does not have good discriminatory power for high blood pressure in adolescents. *JOURNAL OF STRENGTH AND CONDITIONING RESEARCH*. v.37, p.46, 2023.
11. ZANLORENCI, SUELLEM; GONÇALVES, LETICIA; **DE LIMA, TIAGO RODRIGUES**; SILVA, DIEGO

AUGUSTO SANTOS. Individual and Combined Association between Unhealthy Lifestyle Behaviors and Body Weight Dissatisfaction in a Sample of Adolescents from Southern Brazil. *Children-Basel*. v.10, p.821, 2023.

12. **LIMA, T. R.**; SILVA, D. A. S. Muscle Strength Indexes and Its Association With Cardiometabolic Risk Factors in Adolescents: An Allometric Approach. *RESEARCH QUARTERLY FOR EXERCISE AND SPORT.*, p.1 - 14, 2023.

13. MONTEIRO, L. Z.; FARIAS, J. M.; **LIMA, T. R.**; SCHAFER, A. A.; MELLER, F. O.; SILVA, D. A. S. Physical Activity and Sleep in Adults and Older Adults in Southern Brazil. *International Journal of Environmental Research and Public Health*. v.20, p.1461, 2023.

14. BORGES, LEANDRO LIMA; **LIMA, TIAGO RODRIGUES DE**; SILVA, D. A. S. Accuracy of anthropometric indicators of obesity to identify high blood pressure in adolescents-systematic review. *PeerJ*. v.10, p.e13590, 2022.

15. MARTINS, P. C.; **LIMA, T. R.**; SILVA, A. M.; SILVA, D. A. S. Association of phase angle with muscle strength and aerobic fitness in different populations: A systematic review. *NUTRITION*. v.93, p.111489, 2022.

16. HONICKY, M.; CARDOSO, S. M.; LIMA, L. R. A.; SILVA, D. A. S.; **LIMA, TIAGO RODRIGUES DE**; BACK, I. C.; MORENO, Y. M. F.. Clusters of lifestyle behaviors associated with atherosclerosis risk factors in children and adolescents with congenital heart disease: Floripa Child Study. *Applied Physiology Nutrition and Metabolism*. v.48, p.231, 2022.

17. **LIMA, T. R.**; GONZALEZ-CHICA, D. A.; DORSI, E.; MORENO, Y. M. F.; SUI, X.; SILVA, D. A. S. Muscle strength moderates the relationship between overweight/obesity and cardiometabolic risk markers among adults and elderly. *RESEARCH QUARTERLY FOR EXERCISE AND SPORT*. v.1, p.1, 2022.

18. **DE LIMA, TIAGO RODRIGUES**; MARTINS, PRISCILA CUSTÓDIO; MORENO, YARA MARIA FRANCO; CHAPUT, JEAN-PHILIPPE; TREMBLAY, MARK STEPHEN; SUI, XUEMEI; SILVA, DIEGO AUGUSTO SANTOS. Muscular Fitness and Cardiometabolic Variables in Children and Adolescents: A Systematic Review. *SPORTS MEDICINE*. v.01, p.01 - 21, 2022.

19. MONTEIRO, L. Z.; FARIAS, J. M.; **LIMA, T. R.**; SCHAFER, A. A.; MELLER, F. O.; SILVA, D. A. S. Physical activity and perceived environment among adults from a city in Southern Brazilian. *Ciência & Saúde Coletiva*. v.27, p.2197 - 2210, 2022.

20. **RODRIGUES DE LIMA, TIAGO**; SILVA, D. A. S.; GIEHL, M. W. C.; DORSI, E.; GONZALEZ-CHICA, D. A.. Agrupamentos de Fatores de Risco Cardiometabólicos e sua Associação com Aterosclerose e Inflamação Crônica em Adultos e Idosos em Florianópolis, Sul do Brasil. *Arquivos Brasileiros de Cardiologia*. v.117, p.39 - 48, 2021.

21. MARTINS, P. C.; LIMA, L. R. A.; **LIMA, T. R.**; PETROSKI, E. L.; SILVA, D. A. S. Association between handgrip strength and bone mass parameters in HIV-infected children and adolescents. A cross-sectional study. *SAO PAULO MEDICAL JOURNAL*. v.139, p.405 - 411, 2021.

22. **DE LIMA, TIAGO RODRIGUES**; GONZALEZ-CHICA, D. A.; DORSI, E.; SUI, X.; SILVA, D. A. S. Individual and Combined Association Between Healthy Lifestyle Habits With Muscle Strength According to Cardiovascular Health Status in Adults and Older Adults. *Journal of Physical Activity & Health.*, p.1 - 8, 2021.

23. **DE LIMA, TIAGO RODRIGUES**; SUI, X.; LIMA, L. R. A.; SILVA, D. A. S. Muscle strength and its association with cardiometabolic variables in adolescents: does the expression of muscle strength values matter?. *World Journal of Pediatrics*. v.1, p.1, 2021.

24. **LIMA, T. R.**; GONZALEZ-CHICA, D. A.; DORSI, E.; SUI, X.; SILVA, D. A. S. Muscle strength cut-points for metabolic syndrome detection among adults and the elderly from Brazil. *Applied Physiology Nutrition and Metabolism*. v.46, p.379 - 388, 2021.

25. **DE LIMA, TIAGO RODRIGUES**; SUI, XUEMEI; SILVA, DIEGO AUGUSTO SANTOS. Normalization of

Muscle Strength Measurements in the Assessment of Cardiometabolic Risk Factors in Adolescents. *International Journal of Environmental Research and Public Health*. v.18, p.8428, 2021.

26. MARTINS, P. C.; ALVES JUNIOR, C. A. S.; **DE LIMA, TIAGO RODRIGUES**; SILVA, A. F.; MORAES, M. S.; ZANLORENCI, S.; CASTRO, J. A. C.; SILVA, D. A. S. Prevalence of Brazilian children and adolescents who met health criteria for aerobic fitness: systematic review update for Report Card Brazil Project. *Revista Brasileira de Cineantropometria e Desempenho Humano*. v.23, p.e78858, 2021.

27. SILVA, P. S. C.; **LIMA, T. R.**; BOTELHO, L.; BOING, A. F.. Recommendation and physical activity practice in Brazilians with chronic diseases. *REVISTA DA ASSOCIAÇÃO MÉDICA BRASILEIRA*. v.67, p.366 - 372, 2021.

28. **LIMA, TIAGO RODRIGUES DE**; MARTINS, PRISCILA CUSTÓDIO; ALVES JUNIOR, CARLOS ALENCAR SOUZA; MORAES, MIKAEL SEABRA; ZANLORENCI, SUELLEM; BORGES, LEANDRO LIMA; CASTRO, JOÃO ANTÔNIO CHULA DE; SILVA, DIEGO AUGUSTO SANTOS. Report Card Brazil: systematic review of muscle strength assessment in children and adolescents in Brazil. *Revista Brasileira de Cineantropometria e Desempenho Humano*. v.23, p.e80292, 2021.

29. **LIMA, T. R.**; GONZALEZ-CHICA, D. A.; SUI, X.; SILVA, D. A. S. The independent and joint associations among muscle strength, abdominal obesity and cardiometabolic variables among adults. *European Journal of Sport Science*., p.1 - 10, 2021.

30. **LIMA, T. R.**; MORAES, M.; ANDRADE, J. H. C.; FARIAS, J. M.; SILVA, D. A. S. ASSOCIATED FACTORS WITH THE ISOLATED AND SIMULTANEOUS PRESENCE OF OVERWEIGHT AND ABDOMINAL OBESITY IN ADOLESCENTS. *REVISTA PAULISTA DE PEDIATRIA (ONLINE)*. v.38, p.1, 2020.

31. **DE LIMA, TIAGO RODRIGUES**; MARTINS, P. C.; LA TORRE, G. ; MANNOCCI, A; SILVA, K. S.; SANTOS SILVA, DIEGO AUGUSTO. Association between muscle strength and risk factors for metabolic syndrome in children and adolescents: a systematic review. *Journal of Pediatric Endocrinology and Metabolism*. v.xxx, p.xxxx, 2020.

32. MARTINS, P. C.; **LIMA, T. R.**; MORAES, M.; SILVA, D. A. S. Association between total and regional body fat to bone parameters of university athletes. *SPORT SCIENCES FOR HEALTH (TESTO STAMPATO)*., p.1, 2020.

33. **LIMA, T. R.**; GONZALEZ-CHICA, D. A.; SILVA, D. A. S. Clusters of cardiovascular risk factors and its association with muscle strength in adults. *JOURNAL OF SPORTS MEDICINE AND PHYSICAL FITNESS*. v.60, p.479 - 485, 2020.

34. GUERRA, P. H.; RIBEIRO, E. H. C.; **LIMA, T. R.**; ANDRADE, D. R.; LOCH, M. R.. Effects of community-based interventions on physical activity promotion in adults: systematic review. *REVISTA BRASILEIRA DE ATIVIDADE FÍSICA E SAÚDE*. v.25, p.e0130, 2020.

35. **LIMA, T. R.**; GONZALEZ-CHICA, D. A.; MORENO, Y. M. F.; SILVA, D. A. S. Healthy lifestyle moderates the relationship between cardiovascular disease with blood pressure, body composition, carotid intima-media thickness, and glycated hemoglobin among adults. *Applied Physiology Nutrition and Metabolism*. v.45, p.539 - 546, 2020.

36. **RODRIGUES DE LIMA, TIAGO**; MARTINS, P. C.; GUERRA, P. H.; SILVA, DIEGO AUGUSTO SANTOS. Muscular strength and cardiovascular risk factors in adults: systematic review. *PHYSICIAN AND SPORTSMEDICINE*., p.1, 2020.

37. SILVA, ADELSON FERNANDES DA; XAVIER, LAÍS CASTILHO; DOS SANTOS, LARISSA FERREIRA; SANTOS, MARIA CLARA ALVARO; FIGUEIREDO, SALETE APARECIDA DUARTE; CARVALHO, DEYVID RAFAEL DIAS; SOUZA, FELIPE GALDINO; JACQUES, NÍVEA MARIA DE OLIVEIRA; **DE LIMA, TIAGO RODRIGUES**; SILVA, DIEGO AUGUSTO SANTOS. Tabagismo e consumo de álcool em adolescentes de uma cidade de pequeno porte do Brasil. *REVISTA ELETRÔNICA ACERVO EM SAÚDE*. v.1, p.e2856, 2020.

38. **RODRIGUES DE LIMA, TIAGO**; GONZALEZ-CHICA, D. A.; MORENO, Y. M. F.; SILVA, D. A. S. The

Independent and joint associations between muscle strength, health variables and cardiovascular disease among adults. PHYSICIAN AND SPORTSMEDICINE., p.xx, 2020.

Capítulos de livros publicados

1. SILVA, D. A. S; LIMA, L. R. A.; GONCALVES, E. C. A.; MORAES, M. S.; MARTINS, P. C.; **LIMA, T. R.**; CORDEIRO, B.; CAPISTRANO, V.. Composição Corporal do Adulto In: Tratado de Nutrição Esportiva Funcional, ed.2. Rio de Janeiro: Guanabara Koogan, 2021, p. 178 - 210.

Artigos científicos

Counseling on physical activity before and during the Covid-19 pandemic among users of the Brazilian community health promotion program

Aconselhamento sobre atividade física antes e durante a pandemia de Covid-19 em usuários do Programa Academia da Saúde do Brasil

Asesoramiento sobre actividad física antes y durante la pandemia de Covid-19 para usuarios del Programa Academia da Saúde do Brasil

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Abstract The aim is to investigate the association between physical activity counseling before and during the Covid-19 pandemic and sociodemographic variables, according to body mass index (BMI) and participation time in the program. A cross-sectional study was conducted with 979 users aged 20 years or older. Before the pandemic, being ≥ 60 years of age was associated with counseling in users with up to one year of participation in the program. During the pandemic, being ≥ 60 years of age and having higher education were aspects associated with counseling among participants with normal weight. Furthermore, being separated/widowed among those classified as overweight/obesity, and being female and having higher education among those with up to one year in the program were aspects associated with counseling during the pandemic. Before the pandemic, counseling was associated with age ≥ 60 years in participants with up to one year in the program. During the pandemic, age ≥ 60 years and a higher number of years of education were associated with physical activity counseling among those with normal weight. Additionally, being separated/widowed was associated with overweight/obesity. During the pandemic, being female and higher educational attainment were associated with physical activity counseling.

Keywords Health promotion, Counseling, Motor activity

Resumo O objetivo é investigar a associação entre aconselhamento sobre atividade física antes e durante a pandemia de Covid-19 e variáveis sociodemográficas, de acordo com o Índice de Massa Corporal (IMC) e tempo de programa. Estudo transversal com 979 usuários com idade de 20 anos ou mais. Antes da pandemia, ter idade ≥ 60 anos foi associado ao aconselhamento nos usuários com até um ano de Programa. Durante a pandemia, ter idade ≥ 60 anos e maior escolaridade foram aspectos associados ao aconselhamento entre os participantes com peso normal. Ser separado/viúvo entre aqueles classificados com sobrepeso/obesidade e ser do sexo feminino e ter maior escolaridade entre aqueles com até um ano no Programa foram aspectos associados ao aconselhamento durante a pandemia. Antes da pandemia, o aconselhamento esteve associado à idade ≥ 60 anos em participantes com até um ano no programa. Durante a pandemia, idade ≥ 60 anos e maior número de anos de estudo foram associados ao aconselhamento entre aqueles com peso normal. Ainda, ser separado/viúvo estava associado ao sobrepeso/obesidade. Durante a pandemia, ser do sexo feminino e maior escolaridade foram associados ao aconselhamento sobre atividade física.

Palavras-chave Promoção da saúde, Aconselhamento, Atividade motora

Resumen El objetivo es investigar la asociación entre consejos sobre actividad física antes y durante la pandemia Covid-19 y variables sociodemográficas, según índice de masa corporal (IMC) y tiempo de programa. Estudio transversal con 979 usuarios de 20 años o más. Antes de la pandemia, tener ≥ 60 años se asociaba con consejería para usuarios con hasta un año de permanencia en el Programa. Durante la pandemia, tener ≥ 60 años y tener educación superior fueron aspectos asociados con el asesoramiento entre los participantes con peso normal. Ser separado/viudo entre los clasificados con sobrepeso/obesidad y ser mujer y tener educación superior entre los que tienen hasta un año en el Programa fueron aspectos asociados a la consejería durante la pandemia. Antes de la pandemia, la consejería se asociaba con la edad ≥ 60 años en participantes con hasta un año en el programa. Durante la pandemia, la edad ≥ 60 años y más años de educación se asociaron con el asesoramiento entre las personas con peso normal. Además, estar separado/viudo se asoció con sobrepeso/obesidad. Durante la pandemia, ser mujer y tener estudios superiores se asociaron con consejos sobre actividad física.

Palabras clave Promoción de la salud, Asesoramiento, Actividad motora

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Relationship of skeletal muscle mass, length of sports experience, and sexual maturity with bone density and geometry in adolescent athletes

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Abstract

Objective: To identify the relationship between length of sports experience, muscle mass, and sexual maturity with bone mineral density (BMD) and geometry in adolescent basketball and track and field athletes.

Method: The study included adolescent (11–18 years) athletes, of both sexes, who practiced basketball ($n = 26$) or track and field ($n = 24$). Skeletal muscle mass was measured by bioelectrical impedance analysis. Data on sports training and sexual maturity were collected through a questionnaire. Total body, lumbar, femoral, and forearm BMD were determined by dual-energy X-ray absorptiometry. Femoral scans were used to generate bone geometry measurements (femur strength index, cross-sectional area, cross-sectional moment of inertia, section modulus, and buckling ratio). Bone outcomes were compared between modalities by the Mann–Whitney *U*-test or Student's *t*-test and by analysis of covariance with adjustment for sports experience, sexual maturity, and skeletal muscle mass.

Results: In the crude analysis, the basketball group had higher mean values for height, body weight, muscle mass, femoral neck BMD, cross-sectional area, and cross-sectional moment of inertia. In the covariate-adjusted analysis, the track and field group had higher total-body-less-head (0.995 vs. 1.035, $p = 0.043$), lumbar (1.012 vs. 1.107, $p = 0.005$), and radial (0.734 vs. 0.800, $p = 0.005$) BMD. Muscle mass was the main covariate influencing bone parameters, followed by sexual maturity.

Conclusion: Skeletal muscle mass was the main determinant of bone outcomes in adolescent athletes, followed by sexual maturity, underscoring the importance of considering these variables when assessing bone health in this population.

Keywords: Adolescents; Athletes; Bone mineral density; Muscle mass; Sexual development.

Introduction

Childhood and adolescence are critical periods for the development of peak bone mass, with bone mass

accumulating slower during childhood and faster during adolescence.¹ About 39% of the total bone mass is accrued during the two years before and the two years after the peak bone mass growth period (11.8 years in girls and 13.5 years in boys). By four years after the peak growth rate, about 95% of the adult bone mass has typically been accumulated.² Thus, the sexual maturation phase may be a crucial period to enhance bone mass accumulation.¹

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Review

Health-Related Physical Fitness Evaluation in HIV-Diagnosed Children and Adolescents: A Scoping Review

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Abstract: Background: Health-related physical fitness has been widely used to investigate the adverse effects of HIV infection/ART in children and adolescents. However, methods/protocols and cut-points applied for investigating health-related physical fitness are not clear. The aim of this scoping review was to map the literature to identify gaps in knowledge regarding the methods/protocols and cut-points. Methods: A scoping review, following the Joanna Briggs Institute (JBI) guidelines, was conducted through ten major databases. Search followed the PCC strategy to construct block of terms related to population (children and adolescents), concept (health-related physical fitness components) and context (HIV infection). Results: The search resulted in 7545 studies. After duplicate removal, titles and abstracts reading and full text assessment, 246 studies were included in the scoping review. Body composition was the most investigated component ($n = 244$), followed by muscular strength/endurance ($n = 23$), cardiorespiratory fitness ($n = 15$) and flexibility ($n = 4$). The World Health Organization growth curves, and nationals' surveys were the most reference values applied to classify body composition ($n = 149$), followed by internal cut-points ($n = 30$) and cut-points developed through small populations ($n = 16$). Cardiorespiratory fitness was classified through cut-points from three different assessment batteries, as well as cut-points developed through studies with small populations, muscular strength/endurance and flexibility were classified through the same cut-points from five different assessment batteries. Conclusions: The research on muscular strength/endurance, cardiorespiratory fitness and flexibility has been scarcely explored. The lack of studies that investigated method usability as well as reference values was evidenced.

Keywords: acquired immunodeficiency syndrome; chronic disease; physical activity assessment



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1. Introduction

In the 1980s, period when the first cases were recorded, the human immunodeficiency virus (HIV) infection with was highly lethal [1,2]. However, in the 1990s, with the introduction of combined antiretroviral therapy (ART), the characterization of the HIV infection was changed from highly lethal to a controllable chronic disease [1,2]. Thus, substantially increasing the life expectancy and quality of life of HIV-infected children and adolescents [1–3]. ART's main objectives are to suppress HIV replication, rebuild immune function and reduce drug resistance, as well as toxicity, allowing for adequate growth and development [1]. Despite being the main way in the treatment of HIV infection, continuous use of ART can lead to adverse effects such as complications of the cardiovascular and nervous systems, dyslipidemia, insulin resistance and changes in body composition, in addition to mitochondrial and renal toxicity [3–5]. Furthermore, in 2021, around 160,000 new cases of HIV infection in children and adolescents and 97,500 deaths of HIV-diagnosed children and adolescents under the age of 15 were recorded [6], and this high mortality rate over the number of new cases may be related to the adverse effects of prolonged use of

Individual and Joint Association between Cardiovascular Disease Risk Factors and Inadequate Lifestyle Behaviors in a Sample from Brazil

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Abstract

Background: Cardiovascular diseases (CVD) are often influenced by modifiable factors, notably individuals' lifestyle choices, which play a crucial role in modulating cardiovascular risk.

Objective: To investigate the individual and simultaneous association between inadequate lifestyle behaviors and risk factors for CVD in adults and older adults.

Method: A cross-sectional study with 1079 users of the Health Academy Program in Brazil. Information related to inadequate diet, excessive alcohol consumption, smoking, and physical inactivity were individually and collectively investigated (0, 1, or ≥ 2 factors) in association with CVD risk factors (hypertension, hypercholesterolemia, diabetes mellitus, and obesity), considering the following two outcomes: presence of CVD risk factors and number of CVD risk factors present in the same individual (0, 1, 2, or ≥ 3 risk factors). Logistic and multinomial logistic regression analyses were used. The statistical significance adopted was 5%.

Results: A higher number of inadequate lifestyle behavior was associated with greater odds of simultaneous presence of 1, 2, or ≥ 3 CVD risk factors. The simultaneous adoption of 1 and ≥ 2 inadequate lifestyle behaviors was associated with greater odds of hypercholesterolemia. Simultaneous adherence to ≥ 2 inadequate lifestyle behaviors was associated with lower odds of hypertension.

Conclusion: A greater number of inadequate lifestyle behaviors was associated with higher odds of simultaneous presence of multiple CVD risk factors.

Keywords: Adult Health; Health of the Elderly; Health Risk Behaviors; Heart Disease Risk Factors.

Introduction

Cardiovascular diseases (CVD) are a constant concern for public health, and they are among the leading causes of morbidity and mortality worldwide.^{1,2} These conditions are often influenced by modifiable factors, notably individuals' lifestyle choices, which play a crucial role in modulating cardiovascular risk.^{3,4} Smoking,⁵ excessive alcohol consumption,⁶ physical inactivity,³ and inadequate dietary habits⁷ have been identified as the main elements responsible for the majority of deaths related to non-communicable diseases.^{2,8}

Although the literature reveals an association between alcohol consumption and CVD, this relationship is still considered complex and, at times, paradoxical.⁶ On one hand, modest intake of alcoholic beverages has been associated with

lower incidence and mortality from CVD, whereas excessive consumption of alcoholic beverages substantially increases the risk of CVD, on the other.⁹

Smoking is another variable that has been associated with an increased risk for outcomes directly related to CVD,^{10,11} including stroke, acute myocardial infarction, coronary heart disease, peripheral artery disease, heart failure, and hypertension.¹¹ Smoking is also one of the main causes of chronic inflammatory state in the body, which contributes to the development of atherogenic disease processes and increases the levels of inflammatory biomarkers, known as indicators of cardiovascular events.¹⁰

Physical inactivity has been considered a well-established risk factor for the development of CVD, as highlighted by the United States Department of Health and Human Services in 2018.¹² Regular physical activity not only has a positive impact on blood pressure levels,¹³ but also plays a crucial role in reducing the risk of obesity and diabetes.¹⁴

Dietary patterns have a significant impact on various risk factors related to cardiometabolic health, encompassing conditions such as heart diseases, stroke, and type 2 diabetes.¹⁵ These diseases collectively generate considerable impacts both on public health and economies.¹⁶ Understanding how dietary elements relate to cardiometabolic diseases is fundamental in establishing priorities, directing public health policies, and

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Secular trends and sociodemographic, biological, and behavioural factors associated with handgrip strength in adolescents in southern Brazil: An allometric approach

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Original Article

24-h movement guidelines and its association with health-related physical fitness in Brazilian adolescents

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ABSTRACT

Purpose: To examine the link between adherence to 24-h movement guidelines (isolated and combined) and muscular strength, cardiorespiratory fitness, and obesity indicators in Brazilian adolescents.

Methods: Data from 980 adolescents (14–19 years) in Florianópolis, Brazil, were analyzed. The dependent variables were body mass index (BMI), body fat, handgrip strength (HGS), maximal oxygen consumption ($\dot{V}O_{2max}$). The independent variables were physical activity (PA, IPAQ), screen time (ST), sleep (bedtime, wake-up time). Compliance was calculated for each behavior and combinations. Multiple linear regression models were employed.

Results: Overall compliance: 4.1% (boys), 4.9% (girls). Positive associations were found between PA adherence and HGS/ $\dot{V}O_{2max}$ in both sexes, ST adherence and $\dot{V}O_{2max}$, and adherence to all three guidelines and $\dot{V}O_{2max}$. Girls showed positive associations between combined PA + sleep adherence and HGS, ST + sleep and $\dot{V}O_{2max}$, and negative associations between adherence to two guidelines and BMI. Boys exhibited a negative association between PA and body fat, positive between ST and HGS, and positive/negative between combined PA + ST adherence and HGS/body fat. Moreover, adherence to all three guidelines associated positively with HGS.

Conclusion: Adhering to 24-h movement guidelines, alone or in combination, benefits muscular strength and cardiorespiratory fitness in Brazilian adolescents. However, simultaneous adherence did not correlate with obesity indicators.

1. Introduction

Maintaining muscle strength, cardiorespiratory fitness and body composition, components of health-related physical fitness, contribute to better carrying out daily activities and building an autonomous and long-lasting life.¹ Conversely, low levels of muscular strength² cardiorespiratory fitness,³ and high levels of body fat⁴ are associated with an increased risk of all-cause mortality.

Among the correlates for promoting health-related physical fitness indicators are movement behaviors that can be performed 24 hour (h) a day, including physical activity (PA), sleep duration and sedentary behavior measured by screen time (ST).^{5,6} Regular PA is associated with the maintaining and improving muscular strength,² improving cardiorespiratory fitness,³ and controlling body fat.⁷ Short sleep duration has

been associated with an increased risk of obesity,⁸ decreased cardiorespiratory fitness⁹ and muscular strength.¹⁰ Longer periods of ST have been associated with a greater risk of obesity,^{11,12} decline in muscular strength and cardiorespiratory fitness.^{11,13}

The 24-h movement guidelines, as advocated by the Canadian Society for Exercise Physiology, recognizes their interconnectedness, suggesting that changes in one behavior can influence the others' duration.⁵ Studies indicate associations between these behaviors and cardiorespiratory fitness,¹⁴ although the relationship with muscular strength^{14,15} and body fat^{16,17} presents divergent results. However, even though the adoption of 24-h movement guidelines contributes positively to overall health,^{5,6} the prevalence of adolescents meeting all three guidelines for these behaviors was 3.54% for boys and 1.86% for girls.¹⁸ In Brazil, the prevalence of meeting guidelines in children and adolescents was 11.7% and fell to 7.5% after COVID-19 isolation.¹⁹ These numbers underscore the scarcity

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“Academia da Saúde” program: mapping evidence from the largest health promotion community program in Brazil

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The aim of this scoping review was to map the literature related to the “Academia da Saúde” Program, including the objective and rationale of the studies, activities carried out in the program’s centers, as well as the actors involved in these actions. The search for evidence was conducted in the MEDLINE, LILACS, Web of Science, Scopus, COCHRANE, and SciELO databases. Additional evidence was investigated in the Catalog of Theses and Dissertations of the Coordination of Improvement of Higher Education Personnel (CAPES-Brazil) and in the Brazilian Digital Library of Theses and Dissertations, in addition to manual searches in the references of the studies/documents. Out of 642 initial records, the information synthesis was composed of 74 studies/documents ($n = 54$; 73.0% scientific articles, $n = 48$; 64.9% with cross-sectional design, $n = 45$; 60.8% quantitative analysis). Nutrition ($n = 24$; 32.2%) and evaluation of the Program ($n = 27$; 36.5%) were the main themes analyzed. Regarding the participant/object analyzed in each study, users ($n = 39$; 52.6%) were the main actors investigated. Future studies should consider investigating the effectiveness of the actions developed in the program centers, especially physical activity and healthy eating practices.

KEYWORDS

public health, nutrition, health promotion, physical activity, population health

1. Introduction

Non-communicable diseases (NCDs) are recognized as multifactorial diseases and they are associated with modifiable risk factors (1), including smoking, excessive alcohol consumption, inadequate food intake, and physical inactivity (2). In Brazil, NCDs (i.e., cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes mellitus) are responsible for approximately 72% of all deaths (3, 4), disproportionately affecting vulnerable groups (5), such as the older adults, individuals with low income, low education, and those with limited access to public health care services (6).

In Brazil, actions and programs derived from public policies have been implemented with the objective of reducing NCDs. Among the nationally conducted actions, the Strategic Action Plan for Coping with NCDs 2011–2022 (2), developed by the Brazilian Ministry of Health, stands out. This action aims to develop and implement public policies for the prevention and control of morbidity and risk factors through the strengthening of health services (1, 2). The Strategic Action Plan for Coping with NCDs 2011–2022 is based on three main pillars: (1) surveillance, information, evaluation, and monitoring; (2) health promotion; (3) comprehensive



Association between cardiorespiratory fitness and low back pain is anxiety-dependent: A prospective cohort study among adults and older adults

Diego Augusto Santos Silva, Tiago Rodrigues de Lima, Carl J. Lavie & Xuemei Sui

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Body Weight Dissatisfaction and Health Risk Behaviors in Adolescents

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Abstract

Body weight dissatisfaction has been described as a marker for various health diseases, given its direct association with social, physical, and emotional suffering. We investigated the association between body weight dissatisfaction and health risk behaviors in adolescents. This was a cross-sectional study conducted with 668 adolescents aged 14–19 years in the city of São José, southern Brazil. Body weight satisfaction/dissatisfaction was assessed using a questionnaire validated for the investigated population. Health risk behaviors included smoking, alcohol, illicit drugs, medication, non-prescription anabolic steroids, not using seatbelt, unsafe sexual behavior and not knowing how to deal with day-to-day stress. Among males, 66.1% were dissatisfied with their body weight (32.1% due to thinness and 34.0% due to overweight). Among females, 80.0% were dissatisfied with their body weight (24.5% due to thinness and 55.5% due to overweight). There were no significant differences regarding health risk behaviors according to body weight satisfaction/dissatisfaction and sex. Compared to males who were satisfied with their body weight, those who were dissatisfied due to being overweight were more likely to be using tobacco (OR: 2.9; 95% CI: 2.1–4.2), alcohol (OR: 1.7; 95% CI: 1.5–1.9) and anabolic steroids (OR: 2.7; 95% CI: 1.2–5.7). Compared to females who were satisfied with their body weight, those who were dissatisfied due to thinness were

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Handgrip Strength Is Not Associated With High Blood Pressure and Does Not Have Good Discriminatory Power for High Blood Pressure in Adolescents

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Abstract

de Lima, TR and Silva, DAS. Handgrip strength is not associated with high blood pressure and does not have good discriminatory power for high blood pressure in adolescents. *J Strength Cond Res* 37(1): 46–54, 2023—Muscle strength measured by handgrip strength (HGS) was inversely and independently associated with high blood pressure (HBP). In addition, HGS has been used as a valuable indicator for monitoring pediatric health. This study aimed to investigate the association between HGS indexes and HBP, verify the discriminatory capacity of HGS to identify HBP in adolescents, and propose cut-points for HGS to be used in the early identification of HBP if good discriminatory power is identified between the variables. This was a cross-sectional study comprising 811 adolescents (male: 48.9%; age: 16.4 ± 1.3 years) from southern Brazil. Blood pressure was measured by the oscillometric method. Handgrip strength was assessed by a hand dynamometer and 3 different approaches were adopted: (a) HGS in kilogram-force, (b) normalized HGS (HGS/body mass), and (c) allometric HGS ($\text{HGS}/\text{body mass}^{-0.67}$). Binary logistic regression was used to verify the association between HGS indexes and HBP, and the receiver operating characteristic (ROC) was used to determine the possible use of HGS as a diagnostic tool for HBP. Handgrip strength indexes were not associated with HBP ($p > 0.05$), and ROC analyses showed a nonsignificant discriminating accuracy for most of the HGS indexes analyzed ($p > 0.05$) in identifying HBP in boys and girls. The area under curve (AUC) values ranged from 0.499 [95% CI [0.403–0.596] for allometric HGS among overweight or obese boys) to 0.595 [95% CI [0.546–0.643] for HGS among boys). Handgrip strength was not associated with HBP, and its use in the screening of HBP in adolescents is not recommended.

Key Words: hand strength, diagnosis, hypertension, physical fitness, arterial pressure

Introduction

Hypertension or high blood pressure (HBP) has been considered the main risk factor for the global burden of disease because it is directly related to cardiovascular disease, the leading cause of death worldwide (30). Approximately 1 in 5 adults has HBP (40), and although HBP is less common in the pediatric population compared with adult, children and adolescents with HBP are more likely to have persistent HBP and increased risk for cardiovascular disease in adulthood (8).

Among the risk factors for HBP, obesity has been described as one of the main contributors in children and adolescents (9,26). A study conducted with 237,248 children and adolescents (aged 6–17 years) identified that having obesity was associated with a 4-fold to 10-fold increase in the risk for HBP (26). In addition, it was identified that among healthy adolescents, a one-unit increase in body mass index (BMI) was associated with an increased risk for systolic blood pressure above 130 mm Hg in boys and girls (9).

Muscle strength as indicated by handgrip strength (HGS) has become an important cardiometabolic marker in children and

adolescents (13,42). For blood pressure, studies have demonstrated that high muscle strength was associated with low blood pressure (11,12). However, lack of association (12) or even direct association for this interrelation was also described (45). Among the possible justifications for the lack of common direction for the associations, it is speculated that the absence of consensus regarding thresholds to detect high or low levels of HGS related to HBP may contribute to this disagreement (11,12,45). For this reason, studies (11,12,45) used normative values of muscle strength obtained in the sample evaluated (e.g., the percentile distribution of values obtained) to classify individuals in relation to the achievement or not of HGS levels related to HBP, which may not be suitable for comparison with the results of other studies.

Another aspect that contributes to the discordant results for the association between HGS and blood pressure has been related to the way body size was considered in the HGS results obtained (11,12,45). This is because although HGS values are greatly affected by body size (15,16), the best strategy to minimize the influence of body size on the HGS values obtained is not known. In this way, studies that investigated the association between HGS levels and blood pressure in a pediatric population used absolute values (45) or adopted the ratio between the absolute values of HGS and body mass (normalization) as a strategy to minimize the impact exerted by body size on the identified HGS values (12). However, both strategies can imply the identification of inaccurate results, either by not considering that individuals with larger body size will obtain greater values of HGS compared with

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Article

Individual and Combined Association between Unhealthy Lifestyle Behaviors and Body Weight Dissatisfaction in a Sample of Adolescents from Southern Brazil

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Abstract: The individual and combined association between unhealthy lifestyle behaviors and body weight dissatisfaction in adolescents was investigated. This cross-sectional research used data from 676 students (348 female), aged between 14 and 19 years old (mean of 14.6 years old) from southern Brazil. Unhealthy lifestyle behaviors and body weight dissatisfaction were assessed through a questionnaire. Unhealthy lifestyle behaviors included smoking, excessive alcohol consumption, sedentary lifestyle, and poor diet, and were analyzed as individual factors and as combinations of behaviors. For males, smoking (OR: 2.6; 95% CI: 1.6–4.0) and the combination of smoking/excessive consumption of alcoholic beverages (OR: 2.5; 95% CI: 1.1–5.8) were directly associated with the desire to reduce body weight, whereas the combination of smoking/inadequate diet (OR: 1.3; 95% CI: 1.0–1.6) was associated with the desire to increase body weight. For females, the combinations of inadequate diet/physical inactivity (OR: 1.6; 95% CI: 1.0–2.5) and of smoking/excessive consumption of alcoholic beverages (OR: 1.9; 95% CI: 1.4–2.8) were directly associated with the desire to reduce body weight. The presence of simultaneous unhealthy lifestyle behaviors is associated with bodyweight dissatisfaction in adolescents.

Keywords: health promotion; adolescent health; body weight; lifestyle



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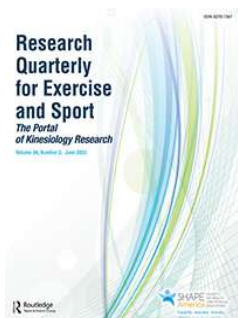


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1. Introduction

Puberty is seen as an intermediate stage between childhood and adulthood, marked by notable changes in the body, personality, and attitudes [1]. During this phase of life, adolescents experience body changes related to puberty (i.e., development of secondary sexual characteristics and growth acceleration), which in addition to the need to meet society's expectations and impositions can represent a challenge for bodyweight perception [2]. In a context marked by bodily transformations and changing responsibilities and behavioral patterns, young people who cannot achieve certain physical characteristics (i.e., thinness for women, and lean mass and muscle for men) [2,3], may be susceptible to developing bodyweight dissatisfaction [4].

The estimated prevalence of bodyweight dissatisfaction in adolescents (11 to 15 years old) from developed countries ranges from 51.0% in the USA to 55.2% in Italy for females, and 37.7% in the USA to 39.9% in Italy for males [5]. In Brazil, the estimated prevalence of bodyweight dissatisfaction in adolescents (12 to 17 years old) of either sex is 45.0% [6]. In addition to sex (females were identified as being more prone to bodyweight dissatisfaction compared with males) [7], high income level [8], higher age group [7], and being overweight [7] were aspects directly associated with bodyweight dissatisfaction among adolescents.



Muscle Strength Indexes and Its Association With Cardiometabolic Risk Factors in Adolescents: An Allometric Approach

Tiago R. de Lima & Diego A. S. Silva

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Article

Physical Activity and Sleep in Adults and Older Adults in Southern Brazil

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Abstract: Good sleep quality is a well-known indicator of physical and mental health, well-being, and overall vitality. This study aimed to verify the association between the practice of physical activity and sleep duration and quality in adults and older adults in southern Brazil. A cross-sectional population-based study was carried out with 820 individuals of both sexes aged 18 years or more, where sociodemographic variables were collected and also health-related variables. This study included 523 (63.8%) women and 297 (36.2%) men, and the prevalence of adequate sleep hours was 41.5% (95%CI: 39.1; 44.9). People who performed leisure walking were 34% more likely to present adequate sleep duration (PR: 1.34; 95%CI: 1.10; 1.64) compared to those who did not perform leisure walking. Individuals who met the recommendations for moderate or vigorous physical activity were more likely to have good sleep quality (PR: 1.16; 95%CI: 1.01; 1.34). Future health behavior modification strategies to improve sleep quality at the population level should consider encouraging lifestyle improvements, thus increasing the practice of physical activities.

Keywords: physical activity; sleep quality; adults; older adult; epidemiology



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1. Introduction

Good sleep quality is a well-known indicator of physical and mental health, well-being, and overall vitality [1,2]. The term “sleep quality” is widely used by researchers and involves a series of indicators such as sleep latency, number of awakenings > 5 min, wake after sleep onset, and sleep efficiency [2]. A global approach for indexing sleep quality often involves soliciting a self-rating [2]. Another term used in sleep studies is “insufficient sleep”, which is related to the number of hours/day of sleep. The Canadian guideline recommends that an adult (18 to 64 years) should have 7–9 h/day of good quality sleep, while for the older people (aged ≥ 65 years) this amount should be 7–8 h/day [3].

Sleep has long been considered a passive part of human daily lives; however, it plays a fundamental role in human life, as it has restorative, energy conservation, protective and immunological functions. In addition, sleep deprivation affects the individual’s mental and physical well-being, which leads to serious functional impairments in the performance of social roles and interpersonal relationships [1]. Some physiological mechanisms may explain the relationship between sleep and health indicators. Poor sleep quality is associated with increased levels of catecholamine, norepinephrine, and epinephrine [4]. These hormones are released into the body in response to physical or emotional stress. In addition to these hormones, the literature also shows that poor sleep quality is associated with the increased secretion of adrenocorticotrophic hormone and cortisol that can cause disease [4].

Data from Dutch adults showed that 43.2% of them reported insufficient sleep, and 32.1% had some disorder related to inadequate sleep quality [5]. Inadequate sleep quality in Australia affected 45% of adults in 2016 [6]. A study developed in Brazil in 2014



Accuracy of anthropometric indicators of obesity to identify high blood pressure in adolescents—systematic review

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ABSTRACT

Background. Anthropometric indicators of obesity have been associated with blood pressure in adolescents. However, the accuracy of anthropometric indicators of obesity for screening for high blood pressure (HBP) in adolescents is not known. Thus, the aim of the present study was to summarize the set of evidence regarding the predictive ability of anthropometric indicators of obesity to identify HBP in adolescents.

Methods. Searches were performed in five databases: MEDLINE, Web of Knowledge, Scopus, Scientific Electronic online (SciELO) and SportDiscus. The inclusion criteria for studies were: adolescents aged 10–19 years or mean age included in this range, observational and intervention studies, studies that proposed cutoff points for anthropometric indicators of obesity, and studies in English, Portuguese and Spanish. The methodological quality of studies was assessed using the QUADAS-2 instrument.

Results. Ten studies met the inclusion criteria and had their information summarized. Based on the information described in these studies, the anthropometric indicators body mass index (BMI), waist circumference (WC), waist-to-height-ratio (WHtR), triceps skinfold thickness, body adiposity index, C index, body mass, waist-to-arm span ratio, arm fat area, average arm perimeter, fat percentage and arm span were likely to be used in high blood pressure (HBP) screening among adolescents. However, only one study showed acceptable values (moderate to high precision) in relation to the accuracy measurements of described cutoffs.

Conclusion. Caution is suggested in the use of anthropometric indicators of obesity for HBP screening in adolescents, in which a greater number of studies with accurate diagnostic tools are necessary.

Subjects Anatomy and Physiology, Cardiology, Clinical Trials, Epidemiology, Obesity

Keywords Hypertension, Young adult, Precision, Body weight, Anthropometric indicators, High blood pressure

INTRODUCTION

Anthropometric indicators such as body mass (BM), height, waist circumference (WC) and hip circumference (HC) have been described as useful tools to detect factors associated with cardiovascular risk (*Cassiano et al., 2019*), such as insulin resistance, metabolic syndrome, and dyslipidemia (*De Faria et al., 2009; Mastroeni et al., 2019; Beck, Da Silva Lopes & Pitanga, 2011*). Additionally, the predictive power of anthropometric indicators for screening for high blood pressure (HBP) in children and adolescents (*De Quadros et al., 2019; Rimárová et al., 2018*) has been described, and it has been reported

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Review

Association of phase angle with muscle strength and aerobic fitness in different populations: A systematic review

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ABSTRACT

Objectives: The aim of this study was to summarize the evidence on the association of phase angle (PhA) with muscle strength and aerobic fitness in different populations.

Methods: A systematic search on this topic was performed in nine electronic databases (CINAHL, LILACS, PubMed, SciELO, Scopus, SPORTDiscus, ScienceDirect, MEDLINE, and Web of Science) in January 2021. Studies with different designs that permitted extraction of information about the relationships between PhA and muscle strength and between PhA and aerobic fitness were included. A total of 4446 studies were initially identified; 34 were included after reading of the title, abstract, full text, and references. Four of the studies included had a longitudinal design, with samples consisting of participants ages 6 to 92 years. Thirty-two of the 34 studies evaluated the relationship between PhA and muscle strength, two cross-sectional studies investigated only PhA and aerobic fitness, and three cross-sectional studies evaluated both components (muscle strength and aerobic fitness).

Results: PhA was directly associated with muscle strength in 30 cross-sectional studies and two longitudinal studies; the two studies that did not find a direct relationship had a cross-sectional design. For aerobic fitness, the five studies identified reported a direct relationship with PhA.

Conclusions: PhA is directly associated with muscle strength and aerobic fitness in different age groups (children, adolescents, adults, and older adults) and in people with different health conditions (human immunodeficiency virus, Crohn's disease, chronic obstructive pulmonary disease, bariatric surgery, kidney transplant, cancer, hemodialysis, and sarcopenia).

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Introduction

Phase angle (PhA), a parameter of bioelectrical impedance analysis that is calculated from the raw data of resistance R and reactance X_c at the frequency of 50 kHz [1], has been described as a global health indicator, given its capacity for predicting health problems [2]. Evidence indicates that PhA is inversely associated with mortality [1,3], disease prognosis [1], muscle strength [4,5], and physical fitness [6], as well as with fat mass in children [7], adults, and older adults [8] with and without a diagnosis of disease [9,10].

PhA expresses the electrical function of cell membranes and reflects the ratio between the extracellular and intracellular water compartments; alterations in X_c (resulting from changes in

membrane permeability or cell size) contribute directly variations in PhA [11]. Nescolarde et al. [12] observed a reduction in PhA after muscle injury that suggested cell-membrane dysfunction with fluid changes (expansion of extracellular water). Additionally, in pathologic states PhA is sensitive to electrical alterations in tissues [13]. Studies have shown an inverse association of PhA with fluid retention, evaluated by the ratio between extracellular water and total body water, in people with advanced-stage cancer [14], renal failure [15], and heart failure [16]. In general, a high PhA indicates cell-membrane integrity, whereas a low angle suggests cell death or reduced cell function [1,2,12].

Muscle strength and aerobic fitness are important components of health-related physical fitness and are directly associated with a lower risk of developing cardiovascular diseases and metabolic syndrome in different populations [17,18]. Although the mechanisms to determine the association between muscle strength and PhA are not fully established, it has been recognized that muscle

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Clusters of lifestyle behaviors associated with atherosclerosis risk factors in children and adolescents with congenital heart disease: Floripa CHild Study

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Abstract

Secondary cardiovascular disease is the main cause of mortality in congenital heart disease (CHD) patients. The cardiovascular risk could be widely prevented with adherence to a healthy lifestyle; however, clusters of lifestyle behaviors related to atherosclerosis risk factors in children and adolescents with CHD remain unclear. We aimed to describe the clusters of lifestyle behaviors of children and adolescents with CHD and to evaluate their association with atherosclerosis risk factors. We conducted a cross-sectional study on 227 children and adolescents with CHD (median age:10.02 [IQR:7.08–13.02] years). Dietary intake, physical activity (PA), and sedentary behavior (SB) were evaluated. Clusters of lifestyle behaviors were determined using a two-step cluster analysis. Atherosclerosis risk factors evaluated include body fat mass, central obesity, blood pressure, lipid parameters, glucose, C-reactive protein, and carotid intima-media thickness (cIMT). Multiple logistic regressions were used. The “unhealthy: high SB + low PA” cluster was associated with elevated body fat mass, central obesity, and elevated cIMT. Furthermore, the “unhealthy: low PA + unhealthy eating habits” cluster was associated with elevated body fat mass, central obesity, and elevated glucose. The unhealthier lifestyle behavior clusters were associated with atherosclerosis risk factors in children and adolescents with CHD. Multidisciplinary strategies to promote healthy behaviors are needed to prevent cardiovascular disease in later life.

Key words: congenital heart disease, cluster analysis, lifestyle, cardiovascular risk factors, carotid intima-media thickness, obesity

Introduction

Secondary cardiovascular disease (CVD) is the leading cause of early mortality in congenital heart disease (CHD) patients (Wang et al. 2019). CHD pediatric patients show atherosclerosis risk factors, such as elevated concentrations of glucose, lipids, and C-reactive protein (CRP), and elevated carotid intima-media thickness (cIMT) (Cardoso et al. 2020). Also, around 25% of CHD patients are overweight or obese (Tamayo et al. 2015; Honicky et al. 2020). Childhood obesity predisposes to obesity (Ward et al. 2017), atherosclerosis (Freedman et al. 2004), and cardiovascular mortality (Twig et al. 2016) in adulthood. Unhealthy lifestyle behaviors related to obesity seem to often emerge and intensify in children and adolescents with CHD after cardiac procedure (Honicky et al. 2020).

Healthy lifestyle behaviors adherence during childhood may prevent CVD in adulthood (American Academy of Pediatrics 2011; Abriñani et al. 2019). Some lifestyle behaviors

are more atherogenic than others (Ekelund et al. 2012), and although combinations of these factors may coexist within the same individual, their combined effect on atherosclerosis has been barely investigated in children and adolescents (Ekelund et al. 2012; Saunders et al. 2016). A systematic review in children and adolescents demonstrates that healthy lifestyle behavior clusters characterized by the combinations of high physical activity (PA)/sleep or high PA/low sedentary behavior (SB) have higher cardiometabolic health (Saunders et al. 2016). Thereby, the importance to analyze a combination of lifestyle behaviors is highlighted, providing greater robustness to identify high cardiovascular risk groups since an individual in these groups can present multiple cardiovascular risk factors and interrelated lifestyle behaviors (Bel-Serrat et al. 2013; Patterson et al. 2020).

Some previous studies have evaluated lifestyle behaviors, such as PA, SB, eating habits, and dietary pattern in children



Muscle Strength Assessed by Handgrip Strength Moderates the Relationship Between Overweight and Obesity With Cardiometabolic Risk Markers Among Adults and Older Adults

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ABSTRACT

Background and aims: Few population-based studies have studied whether muscle strength (MS) levels influence the relationship between cardiometabolic markers with excess body weight. We investigate the possible moderator role of MS in the relationship between overweight and obesity with cardiometabolic markers. **Methods:** Cross-sectional analysis using data from two studies in Florianópolis, Brazil (EpiFloripa Adult Cohort Study, $n = 862$, 39.3 ± 11.4 years; EpiFloripa Aging Cohort Study, $n = 1,197$, 69.7 ± 7.1 years). MS was assessed by handgrip strength. Body mass index (BMI) was classified as overweight or obesity (BMI 25.0–29.9 or ≥ 30.0 kg/m², respectively). Cardiometabolic markers included systolic (SBP) and diastolic blood pressure (DBP), C-reactive protein (CRP), lipids, glucose markers, and carotid intima-media thickness (CMT). Linear regression models stratified by age groups (adults: <60 years; older adults: ≥ 60 years) and adjusted for confounders were used. **Results:** Compared to those with a normal BMI, overweight and obesity were related to higher SBP, DBP, lnCRP, ln triglycerides, fasting glucose (FG), and glycated hemoglobin (HbA1c), and inversely associated with HDL-C among adults and older adults (p value $< .05$ for all). Additionally, BMI was positively associated with LDL-C and CMT only among adults (p value $< .05$). Among adults and older adults, elevated MS attenuated the adverse relationship between excess body weight with FG and HbA1c. **Conclusion:** Higher MS might help adults and older adults with overweight or obesity reduce their cardiovascular risk by keeping their FG and HbA1c at the same levels of those with a normal BMI.

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Excess body weight directly contributes to insulin resistance and endothelial dysfunction, mainly through metabolic products derived from excessive fat, including hormones, inflammatory markers, and adipokines (The GBD 2015 Obesity Collaborators, 2017; Yumuk et al., 2015). Therefore, overweight and obesity exacerbate different cardiometabolic markers, such as elevated blood pressure levels, dyslipidemia, altered glucose metabolism and systemic inflammation (The GBD 2015 Obesity Collaborators, 2017; Yumuk et al., 2015).

Lifestyle changes, including performing muscle strength (MS) enhancement exercises, have been widely recommended to reduce the burden of morbidity and mortality attributed to obesity (Piercy et al., 2018). MS is inversely associated with obesity (Jackson et al., 2010), and age-related body adiposity (Mason et al., 2007), hypertension risk in pre-hypertensive patients (Maslow et al., 2010), metabolic syndrome incidence (Wijndaele et al., 2007) and coronary heart disease and cerebrovascular diseases (Silventoinen et al., 2009). Besides, MS has a protective effect for premature mortality in healthy individuals (García-Hermoso et al., 2018) and among those with hypertension (Artero et al., 2011).

Although the evidence described in the literature has identified health benefits attributed to MS (Artero et al., 2012), most data came from research studies carried out in high-income countries (Silventoinen et al., 2009; Wijndaele et al., 2007), with individuals at risk for cardiovascular disease (Artero et al., 2011) or involving a male-only sample (Jackson et al., 2010; Maslow et al., 2010; Silventoinen et al., 2009). Nonetheless, these results are extremely relevant for low- and middle-income countries like Brazil, as they are facing a rapid increase in the prevalence of overweight and obesity (Miranda et al., 2020), and concentrate the largest number of preventable deaths associated with cardiovascular disease (Hunter & Reddy, 2013). Thus, investigating the role of MS in reducing the risk of cardiovascular disease among individuals with overweight or obesity in these settings can support the diversification of health interventions.

This study aims to explore at a populational level the association between excess body weight with cardiometabolic markers [(systolic (SBP) and diastolic blood pressure (DBP), C-reactive protein (CRP), triglycerides (TRG), HDL cholesterol (HDL-C), LDL cholesterol (LDL-C), fasting glucose (FG), glycated hemoglobin (HbA1c) and carotid intima-media thickness (CMT)] among adults and older adults from Southern Brazil, and the possible moderating effect of



Muscular Fitness and Cardiometabolic Variables in Children and Adolescents: A Systematic Review

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Abstract

Background The importance of muscular fitness (MF) in the performance of activities of daily living is unequivocal. Additionally, emerging evidence has shown MF can reduce cardiometabolic risk in children and adolescents.

Objectives The purpose of this study was to examine and summarize the evidence regarding the relationship between MF phenotypes (i.e., maximum muscular strength/power, muscular endurance, and maximum muscular strength/power/endurance) and cardiometabolic variables (obesity, blood pressure, lipids, glucose homeostasis, inflammatory markers, and clustered cardiometabolic variables) in children and adolescents.

Design This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and was registered with PROSPERO, number CRD42020179273.

Data Sources A systematic review was performed on five databases (PubMed, EMBASE, SciELO, Scopus, and Web of Knowledge) from database inception to May 2020, with complementary searches in reference lists.

Eligibility Criteria for Selecting Studies Eligibility criteria included (1) a study sample of youth aged ≤ 19 years, (2) an assessment of MF with individual or clustered cardiometabolic variables derived from adjusted models (regardless of test/measurement adopted or direction of reported association), and (3) a report of the association between both, using observational studies. Only original articles published in peer-reviewed journals in English, Portuguese, and Spanish languages were considered. The quality of the included studies was assessed by using the National Heart, Lung, and Blood Institute checklist. The percentage of results reporting a statistically significant inverse association between each MF phenotype and cardiometabolic variables was calculated.

Results Of the 23,686 articles initially identified, 96 were included (77 cross-sectional and 19 longitudinal), with data from children and adolescents from 35 countries. The score for the quality of evidence ranged from 0.33 to 0.92 (1.00 maximum). MF assessed by maximum muscular strength/power was inversely associated with lower obesity (64/113 total results (56.6%)) and reduction in clustered cardiometabolic risk (28/48 total results (58.3%)). When assessed by muscular endurance, an inverse association with obesity (30/44 total results (68.1%)) and cardiometabolic risk (5/8 total results (62.5%)) was identified. Most of the results for the relationship between MF phenotypes with blood pressure, lipids, glucose homeostasis, and inflammatory markers indicated a paucity of evidence for these interrelationships (percentage of results below 50.0%).

Conclusion MF assessed by maximum muscular strength/power or muscular endurance is potentially associated with lower obesity and lower risk related to clustered cardiometabolic variables in children and adolescents. There is limited support for an inverse association between MF with blood pressure, lipids, glucose homeostasis biomarkers, and inflammatory markers in children and adolescents.

Physical activity and perceived environment among adults from a city in Southern Brazilian

Atividade física e percepção do ambiente em adultos de uma cidade do Sul do Brasil

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Abstract *The article aimed to verify the association between physical activity (PA) and perceived environment among adults from a city in southern Brazil. This is a population-based cross-sectional study with 820 adults living in the city of Criciúma-SC. Perceived environment was assessed using the Neighborhood Environmental Walkability scale and PA in the leisure and transportation domains using the long version of the International PA Questionnaire. It was observed that the neighborhood with public spaces for the practice of physical exercises and dog walking was associated with higher prevalence of compliance with moderate-to-vigorous physical activity (MVPA) guidelines. The fact of having an invitation from friends and/or relatives for PA, sporting events and the habit of dog walking were associated with leisure-time walking. Access to places for the purchase of fresh fruits/ vegetables, light/diet foods, to have sidewalks in most streets, to have pedestrian crossings and sporting events in the neighborhood were associated with higher prevalence of active transportation. Conversely, places for snacks or fast food in the neighborhood were associated with lower prevalence of active transportation. The perception of environmental variables was associated with MVPA, walking and active transportation.*

Key words *Epidemiology, Leisure activities, Environmental health*

Resumo *O objetivo foi verificar a associação entre a prática de atividade física (AF) e a percepção do ambiente em adultos de uma cidade do Sul do Brasil. Estudo transversal de base populacional com 820 adultos, residentes na cidade de Criciúma-SC. A percepção do ambiente foi avaliada pela escala Neighborhood Environmental Walkability, e a AF no domínio do lazer e transporte ativo pela versão longa do Questionário Internacional de AF. Observou-se que o bairro com lugar público para a prática de exercícios físicos e o fato de passear com o cachorro estiveram associados a maiores prevalências de atendimento às recomendações de AF moderada à vigorosa (AFMV). O fato de ter convite de amigos e/ou parentes para AF, a realização de eventos esportivos e o hábito de passear com o cachorro estiveram associados à caminhada no lazer. O acesso a locais para aquisição de frutas/legumes frescos, alimentos light/diet, ter calçadas na maioria das ruas, ter faixas de segurança e ter eventos esportivos no bairro estiveram associados a maiores prevalências de deslocamento ativo. De forma contrária, lugares para lanches ou fast-food no bairro se associaram a menor prevalência de deslocamento ativo. A percepção de variáveis do ambiente esteve associada à AFMV, à prática de caminhada e ao transporte ativo.*

Palavras-chave *Epidemiologia, Atividades de lazer, Saúde ambiental*

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Clusters of Cardiometabolic Risk Factors and Their Association with Atherosclerosis and Chronic Inflammation among Adults and Elderly in Florianópolis, Southern Brazil

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Abstract

Background: The significant increase in cardiovascular diseases in developing countries alerts about their impact on underprivileged populations.

Objective: To identify the relationship of clusters of metabolic syndrome (MS) components with atherosclerosis and chronic inflammation among adults and elderly.

Methods: Cross-sectional analysis using data from two population-based cohort studies in Florianópolis, Southern Brazil (EpiFloripa Adult Cohort Study, $n = 862$, 39.9 ± 11.5 years; EpiFloripa Aging Cohort Study, $n = 1197$, 69.7 ± 7.1 years). Blood pressure (BP), waist circumference (WC), and lipid and glucose levels were analyzed as individual factors or as clusters (either as the number of components present in an individual or as combinations of components). Outcomes included carotid intima-media thickness (IMT), atherosclerotic plaques, and C-reactive protein (CRP) levels. Multiple linear and logistic regression analyses adjusted for confounding factors were used. The statistical significance adopted was 5%.

Results: Individuals with high BP, elevated WC, dyslipidemia and hyperglycemia (6.1% of the sample) showed higher IMT and CRP than those negatives for all MetS components. Elevated WC was a common determinant of systemic inflammation, while the coexistence of high BP and elevated WC (clusters of two or three factors) was associated with higher IMT (β between $+3.2$ and $+6.1 \times 10^{-2}$ mm; p value < 0.05) and CRP (β between 2.18 and 2.77; p value < 0.05).

Conclusion: The coexistence of high BP and elevated WC was associated with increased IMT and CRP levels, but central obesity affected systemic inflammation either alone or in combination with other risk factors.

Keywords: Cardiovascular Diseases; Adult; Aged; Epidemiology; Metabolic Syndrome; Lipid Metabolism Disorders; C-Reactive Protein; Risk Factors.

Introduction

Cardiovascular diseases (CVD) are the leading cause of death worldwide, accounting for an estimated 17.8 million deaths in 2017, corresponding to 330 million years of life lost and another 35.6 million years lived with disability.^{1,2} The World Health Organization estimates the number of cardiovascular deaths will reach 23.6 million by 2030, mainly because of heart disease and stroke.³ Approximately 75% of CVD are preventable, and an appropriate control of cardiometabolic risk factors (high blood pressure, body fat excess, high blood glucose, dyslipidemia) is crucial to reduce morbidity and mortality.³

The pathophysiological mechanism of the relationship between CVD and cardiometabolic risk factors involve chronic inflammation – high levels of C-reactive protein (CRP), interleukin-6, tumor necrosis factor- α – as well as micro and macrovascular changes.^{4,5} Biomarkers of chronic inflammation are directly related to the genesis of atherosclerosis, development of unstable plaques,⁶ and most CVD.⁷

According to the literature, some cardiometabolic risk factors are more atherogenic, and although clusters of these factors may coexist within the same individual, their combined effect on atherosclerosis and chronic inflammation has been barely investigated.⁸⁻¹⁰ The available evidence suggests that the atherogenic effect of cardiometabolic risk factors depends on which combination is affecting an individual and may be exacerbated by the coexistence of unhealthy lifestyle (e.g., smoking, sedentary lifestyle, inadequate eating habits).⁸⁻¹⁰ Therefore, identifying clusters of cardiometabolic risk factors with a strong atherogenic effect may contribute to the development of better-targeted preventive strategies. Investigations in this field are particularly relevant for low-and-middle-income countries as, in absolute terms, early deaths related to CVD are concentrated in these countries.^{3,11}

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Association between handgrip strength and bone mass parameters in HIV-infected children and adolescents. A cross-sectional study

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KEY WORDS (MeSH terms):

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AUTHORS' KEY WORDS:

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ABSTRACT

BACKGROUND: Low bone mineral content (BMC) and bone mineral density (BMD) have been identified in human immunodeficiency virus (HIV)-infected children and adolescents. The direct adverse effects of HIV infection and combined antiretroviral therapy (ART) negatively contribute to bone metabolism. A direct relationship between muscle strength levels and BMD in HIV-infected adults and older adults has been described. However, it is unknown whether handgrip strength (HGS) is associated with bone mass in pediatric populations diagnosed with HIV.

OBJECTIVE: To ascertain whether HGS levels are associated with BMC and BMD in HIV-infected children and adolescents.

DESIGN AND SETTING: Cross-sectional study conducted in Florianópolis, Brazil, in 2016.

METHODS: The subjects were 65 children and adolescents (8-15 years) diagnosed with vertically-transmitted HIV. Subtotal and lumbar-spine BMC and BMD were obtained via dual-emission X-ray absorptiometry (DXA). HGS was measured using manual dynamometers. The covariates of sex, ART, CD4+ T lymphocytes and viral load were obtained through questionnaires and medical records. Sexual maturation was self-reported and physical activity was measured using accelerometers. Simple and multiple linear regression were used, with $P < 0.05$.

RESULTS: HGS was directly associated with subtotal BMD ($\beta = 0.002$; $R^2 = 0.670$; $P < 0.001$), subtotal BMC ($\beta = 0.090$; $R^2 = 0.734$; $P = 0.005$) and lumbar-spine BMC ($\beta = 1.004$; $R^2 = 0.656$; $P = 0.010$) in the adjusted analyses. However, no significant association was found between HGS and lumbar-spine BMD ($\beta = 0.001$; $R^2 = 0.464$; $P = 0.299$).

CONCLUSION: HGS was directly associated with BMD and BMC in HIV-infected children and adolescents.

INTRODUCTION

Low bone mineral content (BMC) and bone mineral density (BMD) have been identified in human immunodeficiency virus (HIV)-infected children and adolescents.¹ This occurs because of the direct adverse effects of HIV infection and combined antiretroviral therapy (ART), which negatively contribute to bone metabolism.²⁻⁴ The marked reductions in BMC and BMD are directly associated with increased proinflammatory cytokines, delayed growth and maturational development, decreased muscle mass levels and endocrine disorders, which reduce osteoblast activity and stimulate osteoclasts.^{2,3}

Damage to bone mass is especially worrisome in pediatric populations, whether diagnosed with HIV or not, since during this phase of life, there is greater bone mineral increase.⁵ Approximately 85%-90% of final adult bone mass is reached during childhood and adolescence, and losses from bone accumulation during this critical period may compromise peak bone mass, which is recognized as the determinant for the risks of osteoporosis and fractures in adulthood.⁶

Although major efforts to attenuate bone loss have been based on pharmacological interventions (bisphosphonates)⁷ and vitamin D and calcium supplementation, non-pharmacological strategies based on physical activity that promote gravitational overload (running and jumping) or muscle tension (strength training) have the capacity to induce bone formation stimuli and inhibit bone resorption.^{8,9} Handgrip strength (HGS) enhancement exercises have been suggested as a strategy in HIV treatment because they improve cardiorespiratory fitness, body composition

Individual and Combined Association Between Healthy Lifestyle Habits With Muscle Strength According to Cardiovascular Health Status in Adults and Older Adults

Tiago R. de Lima, David A. González-Chica, Eleonora D'Orsi, Xuemei Sui, and Diego A.S. Silva

Background: The authors aimed to identify the effect of adherence to healthy lifestyle habits on muscle strength (MS) according to a distinct health status. **Methods:** Longitudinal analysis using data from 2 population-based cohorts in Brazil (EpiFloripa adult, $n = 862$, 38.8 [11.4] y—6 y of follow-up length; EpiFloripa Aging, $n = 1197$, 69.7 [7.1] y—5 y of follow-up length). MS was assessed by handgrip strength (kgf). Information assessed by questionnaire regarding adequate physical activity levels, regular consumption of fruit and vegetables, low alcohol consumption, and nonsmoking habits were analyzed in the relationship with MS according to the health status. The participants were grouped into 3 health status categories: (1) with cardiovascular disease (CVD); (2) at risk of CVD (abdominal obesity or overweight/obesity, high blood pressure, hyperglycemia, and dyslipidemia); and (3) healthy individuals (without CVD and risk of CVD). **Results:** Simultaneous adherence of 4 healthy lifestyle habits was directly associated with MS among healthy individuals ($\beta = 10.0$, 95% CI, 2.0–18.0, SE = 4.0), at risk of CVD ($\beta = 5.5$, 95% CI, 0.3–12.6, SE = 3.6), and those with CVD ($\beta = 11.4$, 95% CI, 5.8–16.7, SE = 2.8). **Conclusions:** Adopting a healthy lifestyle can contribute to increased MS in adults and older adults, regardless of health status.

Keywords: hand strength, motor activity, diet, smoking, alcohol drinking

Muscle strength (MS) has been recognized as an important health marker in adults and older adults, given its beneficial effect on cardiometabolic variables (eg, blood pressure, circulating blood glucose levels, and anthropometric indicators).¹ Such a beneficial relationship seems to occur regardless of clinical health conditions, given that MS levels were directly associated with better health indicators in an apparently healthy population,² among those at risk for cardiovascular disease (CVD),³ and among individuals with CVD.^{4,5}

Although some hormones secreted endogenously (eg, testosterone and growth hormone) play a major role in MS levels,⁶ an adherence to healthy lifestyle habits (eg, adequate physical activity levels, regular consumption of fruit and vegetables, low alcohol consumption and nonsmoking) has been recommended, as they seem to promote MS and better health-related outcomes.^{1,7–11}

While an adherence to adequate physical activity levels, regular consumption of fruit and vegetables, low alcohol consumption, and nonsmoking can have a direct effect on MS levels, it is hypothesized that each habit has a distinct impact on MS and that the magnitude of this effect is directly related to the number of healthy habits adopted by the same individual. Thus, considering that adherence to lifestyle habits tends to occur in a combined and not individual way,¹⁰ it is important to investigate the

interrelationship between healthy lifestyle habits and their relationship with MS levels.

Although the adoption of healthy lifestyle habits can directly impact MS levels in adults and older adults,^{1,7–11} it is possible that the individual's health status may impact the direction of this interrelation. This is because the presence of adverse health conditions,¹² as risk factors for CVD (eg, obesity, hyperglycemia, high blood pressure) or CVD itself (eg, angina, heart failure, arrhythmia, stroke) may have a negative impact on MS and its determinants (eg, muscle mass, muscle quality).¹² Thus, it is hypothesized that, when considering health status in the association between healthy lifestyle habits and MS, more accurate results will be identified.

Although results regarding the individual^{7,9,13,14} or combined^{15,16} relationship between healthy lifestyle habits and MS in adults and older adults had been described in the literature, information regarding the longitudinal synergistic effect attributed to the adoption of multiple healthy lifestyle habits or whether such an interrelation differs depending on the individual's health status are not known.^{7,9,13–16} Thus, considering the beneficial relationship between MS and health,¹ and that strategies that aim to prevent and promote health need to contemplate the entire population (healthy and unhealthy individuals) investigate the relationship between modifiable aspects (lifestyle habits) and its association with MS according to health status, could support better-targeted actions for health care.

Thus, the aim of the present study was to identify the individual and combined association between healthy lifestyle habits (ie, adequate physical activity, regular consumption of fruit and vegetables, low alcohol consumption and nonsmoking) and MS among adults and older adults without risk for CVD (without CVD and risk of CVD); at risk for CVD (ie, abdominal obesity or overweight/obesity, high blood pressure, hyperglycemia and dyslipidemia), and those with CVD (ie, myocardial infarction, angina, heart failure, atrial fibrillation/arrhythmia, and/or stroke).

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Muscle strength and its association with cardiometabolic variables in adolescents: does the expression of muscle strength values matter?

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Abstract

Background We investigate the association between different muscle strength (MS) indices with cardiometabolic variables in adolescents.

Methods Cross-sectional study comprising 351 adolescents (male 44.4%, age 16.6 ± 1.0 years) from Brazil. MS was assessed by handgrip strength and analyzed in five different ways: absolute MS and MS normalized for body weight, body mass index (BMI), height, and fat mass, respectively. Cardiometabolic variables investigated as outcomes were systolic and diastolic blood pressure (DBP), waist circumference (WC), high-sensitive C-reactive protein (hs-CRP), lipid and glucose metabolism markers. Multiple linear regression models adjusted for confounding factors were used.

Results Absolute MS and/or MS normalized for height was directly associated with WC [up to 32.8 cm, standard error (SE)=4.7] and DBP (up to 8.8 mmHg, SE=0.8), and inversely associated with high-density lipoprotein cholesterol (up to -8.0 mg/dL, SE=14.1). MS normalized for body weight, BMI or fat mass was inversely associated with WC (up to -17.5 cm, SE=2.2). According to sex, MS normalized for fat mass was inversely associated with triglycerides (male: 0.02 times lower, SE=0.01; female: 0.05 times lower, SE=0.01) and homeostatic model assessment for insulin resistance (male: 0.02 times lower, SE=0.01; female: 0.06 times lower, SE=0.01), and inversely associated with hs-CRP only among male (0.03 times lower, SE=0.01).

Conclusion When normalized for body weight, BMI or fat mass, MS was superior to absolute MS or MS normalized for height in representing adequately cardiometabolic variables among adolescents.

Keywords Abdominal · C-reactive protein · Hand strength · Insulin resistance · Obesity · Triglycerides

Introduction

Muscle strength has been directly associated with cardiometabolic health benefits (e.g., lower propensity to abdominal obesity, reduced blood pressure levels, improved glycemic and lipid metabolism, lower values of inflammatory

markers) in adolescents [1–3]. However, the beneficial relationship does not seem to be a consensus, given that the absence of association [1–3], or even association between muscle strength and worse prognosis in relation to cardiometabolic variables, has been described [1–3].

The discrepancy for divergent results in the interrelationship between muscle strength and cardiometabolic variables in adolescents has been attributed to the way how muscle strength values were expressed in these analyzes [1–3]. This is because muscle strength can manifest in different dimensions (e.g., maximum strength, power, endurance); therefore, it can be assessed in different ways (e.g., standing or sitting, with or without propulsion, static or with support of the own body) [4]. Many of these studies investigating this interrelation (muscle strength/cardiometabolic variables) used absolute muscle strength values, while others considered body-volume-related indices [e.g., body weight, body mass index (BMI), fat mass] or body-length-related indices

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Muscle strength cut-points for metabolic syndrome detection among adults and the elderly from Brazil

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Abstract: We aimed to determine cut-points for muscle strength based on metabolic syndrome diagnosis. This cross-sectional analysis comprised data from 2 cohorts in Brazil (EpiFloripa Adult, $n = 626$, 44.0 ± 11.1 years; EpiFloripa Aging, $n = 365$, 71.6 ± 6.1 years). Metabolic syndrome was assessed by relative handgrip strength (kgf/kg). Metabolic syndrome was defined as including ≥ 3 of the 5 metabolic abnormalities according to the Joint Interim Statement. Optimal cut-points from Receiver Operating Characteristic (ROC) curves were determined. Adjusted logistic regression was used to test the association between metabolic syndrome and the cut-points created. The cut-point identified for muscle strength was 1.07 kgf/kg (Youden index = 0.310; area under the curve (AUC)) = 0.693, 95% CI 0.614–0.764) for men and 0.73 kgf/kg (Youden index = 0.481; AUC = 0.768, 95% confidence interval (CI) = 0.709–0.821) for women (age group 25 to < 50 years). The best cut-points for men and women aged 50+ years were 0.99 kgf/kg (Youden index = 0.312; AUC = 0.651; 95% CI = 0.583–0.714) and 0.58 kgf/kg (Youden index = 0.378; AUC = 0.743; 95% CI = 0.696–0.786), respectively. Cut-points derived from ROC analysis have good discriminatory power for metabolic syndrome among adults aged 25 to <50 years but not for adults aged 50+ years.

Novelty:

- First-line management recommendation for metabolic syndrome is lifestyle modification, including improvement of muscle strength.
- Cut-points for muscle strength levels according to sex and age range based on metabolic syndrome were created.
- Cut-points for muscle strength can assist in the identification of adults at risk for cardiometabolic disease.

Key words: metabolic syndrome, blood pressure, blood glucose, obesity, abdominal, lipids, muscle strength.

Résumé : Cette étude se propose de déterminer les seuils de force musculaire en fonction du diagnostic du syndrome métabolique. Cette analyse transversale comprend des données de deux cohortes au Brésil (EpiFloripa Adultes, $n = 626$, $44,0 \pm 11,1$ ans; EpiFloripa Personnes âgées, $n = 365$, $71,6 \pm 6,1$ ans. La MS est évaluée par la force relative de préhension manuelle (kgf/kg). Le syndrome métabolique est défini par l'inclusion de ≥ 3 des cinq anomalies métaboliques selon la Déclaration provisoire conjointe. Les seuils optimaux provenant des courbes d'efficacité du récepteur (« ROC ») sont déterminés. Une régression logistique ajustée est utilisée pour tester l'association entre syndrome métabolique et les seuils déterminés. Le seuil identifié pour la force musculaire est de 1,07 kgf/kg (indice de Youden = 0,310; aire sous la courbe (« AUC »)) = 0,693, intervalle de confiance (« IC ») à 95 % = 0,614–0,764) pour les hommes et 0,73 kgf/kg (indice de Youden = 0,481; AUC = 0,768, IC à 95 % = 0,709–0,821) pour les femmes (groupe d'âge 25 à < 50 ans). Les meilleurs seuils pour les hommes et les femmes âgés de 50 ans et plus sont de 0,99 kgf/kg (indice de Youden = 0,312; AUC = 0,651; IC à 95 % = 0,583–0,714) et 0,58 kgf/kg (indice de Youden = 0,378; AUC = 0,743; IC à 95 % = 0,696–0,786) respectivement. Les seuils dérivés de l'analyse ROC ont un bon pouvoir discriminatoire pour le syndrome métabolique chez les adultes âgés de 25 à < 50 ans mais pas chez les adultes âgés de 50 ans et plus. [Traduit par la Rédaction]

Les nouveautés :

- La recommandation de prise en charge initiale du syndrome métabolique est la modification du mode de vie y compris l'amélioration de la force musculaire.
- Des seuils pour les niveaux de force musculaire selon le sexe et la tranche d'âge basés sur le syndrome métabolique sont déterminés.
- Les seuils de force musculaire peuvent aider à identifier les adultes à risque de maladie cardiometabolique.

Mots-clés : syndrome métabolique, tension artérielle, glycémie, obésité, abdominale, lipides, force musculaire.

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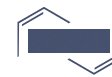
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Article

Normalization of Muscle Strength Measurements in the Assessment of Cardiometabolic Risk Factors in Adolescents

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Abstract: Muscle strength (MS) has been associated with cardiometabolic risk factors (CMR) in adolescents, however, the impact attributed to body size in determining muscle strength or whether body size acts as a confounder in this relationship remains controversial. We investigated the association between absolute MS and MS normalized for body size with CMR in adolescents. This was a cross-sectional study comprising 351 adolescents (44.4% male; 16.6 ± 1.0 years) from Brazil. MS was assessed by handgrip and normalized for body weight, body mass index (BMI), height, and fat mass. CMR included obesity, high blood pressure, dyslipidemia, glucose imbalance, and high inflammation marker. When normalized for body weight, BMI, and fat mass, MS was inversely associated with the presence of two or more CMR among females. Absolute MS and MS normalized for height was directly associated with the presence of two or more CMR among males. This study suggests that MS normalized for body weight, BMI, and fat mass can be superior to absolute MS and MS normalized for height in representing lower CMR among females. Absolute MS and MS normalized for height were related to higher CMR among males.

Keywords: adolescent health; cardiometabolic risk; cardiometabolic disorders; hand strength; physical fitness

1. Introduction

Muscle strength has been described as an important health marker in adolescents [1,2], in view of the inverse association with cardiometabolic risk factors analyzed individually (e.g., high body mass index—BMI, increased waist circumference, high systolic and diastolic blood pressure, high fasting blood glucose, increased levels of glycated hemoglobin, high levels of total cholesterol and triglycerides, high sensitive-C-reactive protein), or in terms of the simultaneous presence of two or more cardiometabolic risk factors (e.g., metabolic syndrome) [1–3]. However, even though studies have identified that muscle strength was inversely associated with cardiometabolic risk factors [1–3], absence of association or even contrary results (e.g., muscle strength directly associated with cardiometabolic risk factors) have been described [1–3].

The conflicting results for the association between muscle strength and cardiometabolic risk factors in adolescents can be related to the different strategies adopted by studies to consider body size in determining muscle strength (normalization for body size) [1–3]. While some studies normalized muscle strength for body mass [4,5], others adopted absolute muscle strength to investigate this interrelationship [6,7]. However, the best strategy to be adopted when considering body parameters in the expression of muscle strength values in adolescents is currently unknown [1,2]. Although muscle strength is directly impacted by muscle mass, fat mass, one of the components of muscle mass, can moderate the magnitude of the muscle mass/muscle strength interrelation [8]. In this sense, it is hypothesized that, when considering the values of muscle strength according to fat mass,

Prevalence of Brazilian children and adolescents who met health criteria for aerobic fitness: systematic review update for Report Card Brazil Project

Prevalência de crianças e adolescentes brasileiros que atenderam aos critérios de saúde para aptidão aeróbia: atualização de revisão sistemática para o Projeto Report Card Brasil

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Abstract – The aim of the study was to update Brazilian evidence on the prevalence of children and adolescents who met health criteria for aerobic fitness. This systematic review is part of the Report Card Brazil Project and the search was restricted to studies published during the period from January 2018 to December 2019 in nine electronic databases. Studies with different designs, which allowed extracting information about the prevalence of children and adolescents who met health criteria for aerobic fitness (age up to 19 years or average age up to 19 years) were included. Studies published from 2020 were not included due to the possible effect of the pandemic on this indicator and because there is no certainty as to when the pandemic will end. Of the 694 studies initially identified, 13 studies with information of 14,673 children and adolescents were included after reading titles, abstracts, full texts and references. The prevalence of children and adolescents who met health criteria for aerobic fitness was 26.9% (29.7% for girls; 44.6% for boys). In this search, eight different cutoff points were used to determine adequate aerobic fitness levels and five tests were used to determine aerobic fitness. Analyzing data from the present review with the previous systematic review of this project, one third of children and adolescents in Brazil meet health criteria for aerobic fitness.

Keywords: Adolescent health; Brazil; Oxygen uptake; Physical fitness.

Resumo – O objetivo do estudo foi realizar uma atualização das evidências brasileiras sobre a prevalência de crianças e adolescentes que atenderam aos critérios de saúde para aptidão aeróbia. Essa revisão sistemática integra o Projeto Report Card Brasil e a busca foi restrita aos estudos publicados durante o período de Janeiro de 2018 a Dezembro de 2019 em nove bases de dados eletrônicas. Estudos com diferentes delineamentos, os quais permitiram extrair informações acerca da prevalência de crianças e adolescentes que atenderam aos critérios de saúde para a aptidão aeróbia (idade até 19 anos ou com média de idade até 19 anos) foram incluídos. Estudos publicados a partir de 2020 não foram incluídos por conta do possível efeito da pandemia nesse indicador e por não haver uma certeza de quando finalizará a pandemia. Do total de 694 estudos inicialmente identificados, 13 estudos com informações de 14.673 crianças e adolescentes foram incluídos após a leitura de títulos, resumo, textos completos e referências. A prevalência de crianças e adolescentes que atenderam aos critérios de saúde para aptidão aeróbia foi de 26.9% (29.7% para as meninas; 44.6% para os meninos). Nessa busca, oito pontos de corte distintos para determinar níveis adequados de aptidão aeróbia foram utilizados, bem como cinco testes foram empregados para se determinar a aptidão aeróbia. Analisando-se os dados da presente revisão com a revisão sistemática anterior desse projeto, um terço das crianças e adolescentes do Brasil atendem aos critérios de saúde para aptidão aeróbia.

Palavras-chave: Saúde do adolescente; Brasil; Consumo de oxigênio; Aptidão física.

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Recommendation and physical activity practice in Brazilians with chronic diseases

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SUMMARY

OBJECTIVE: To analyze the prevalence and factors associated with professional recommendation and leisure-time physical activity (LTPA) in Brazilian individuals diagnosed with hypertension (HBP), diabetes, and/or hypercholesterolemia.

METHODS: This is a cross-sectional population-based study with a representative sample of the Brazilian population (aged ≥20 years) in 2013, with self-reported HBP (n=11.098), diabetes (n=3.176), and/or hypercholesterolemia (n=7.252). Prevalence and gross odds ratios were estimated and adjusted for both outcomes.

RESULTS: Professional recommendation and LTPA were more prevalent in individuals who received recommendation and presented with hypercholesterolemia (85.9 and 23.4%, respectively). Adjusted analysis showed an association in people 40 to 59 years of age and public programs in most diseases. Higher educational level was associated with receiving recommendations in all non-communicable diseases (NCDs). LTPA was associated in people 40 to 59 years of age for HBP and diabetes and in all investigated NCDs, higher educational level, positive perception of health, and a favorable environment in those who received recommendation.

CONCLUSIONS: Education presented the greatest magnitude in the associations, clearly showing the need for equitable methods to increase recommendation and LTPA levels for the most vulnerable population. Further studies analyzing other variables and NCD are needed, corroborating the Ministry of Health.

KEYWORDS: Physical activity. Adherence, patient. Chronic disease. Non-communicable. Health surveys. Health personnel.

INTRODUCTION

Non-communicable diseases (NCDs) are responsible for 41 million deaths in the world¹ annually. In Brazil, approximately 45% of the adult population presents at least one NCD². The main risk factors for NCDs are smoking, excessive consumption of alcoholic beverages, poor food quality, overweight, and insufficient physical activity on prescription (PAP)^{1,3}. PAP accounts for the annual costs for health systems worldwide, which is estimated to exceed \$50 billion⁴. Conversely, sufficient PAP has a positive effect on the

prevention of health-related diseases, in addition to contributing to control and prevention of early mortality attributed to NCDs⁵.

Environmental, demographic, socioeconomic, and psychocognitive factors⁶ are PAP conditioning factors. In addition, the literature indicates the important role of health professionals and services in stimulating PAP. Some studies show that the recommendation of physical activity by health professionals to service users⁷, especially by physicians^{8,9}, is associated with behavioral changes and an increase in PAP^{7,10}. However, few

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Report Card Brazil: systematic review of muscle strength assessment in children and adolescents in Brazil

Report Card Brasil: revisão sistemática sobre avaliação da força muscular em crianças e adolescentes no Brasil

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Abstract – The present study aimed to identify and summarize evidence regarding muscle strength (MS) levels in school children and adolescents (≤ 19 years) in Brazil in order to update previously published evidence from the Report Card Brazil project. The systematic search for information was conducted in seven databases, restricted to studies published during the period from January 2018 to December 2019. Thirteen studies were included, which gathered information from 10,135 children and adolescents from seven Brazilian states. Different tests/protocols for assessing MS were identified, however, handgrip strength was the test most adopted in studies (53.8%). The prevalence of children and adolescents with MS levels considered healthy was 29.8%, considering the totality of information, and 27.6% for males and 31.8% for females. Considering full data reviewed by the Report Card Brazil project (data analyzed in this study in addition to those previously published), information regarding the assessment of MS levels in children and adolescents in Brazil came from studies conducted during the period from 2010 to 2019, which included a sample of 15,208 children and adolescents (aged 7–19 years). According to this information, the prevalence of children and adolescents with MS levels considered healthy in this period was 57.8%, 61.1% for males and 58.8% for females.

Key words: Adolescent health; Child health; Epidemiological monitoring; Physical fitness.

Resumo – O estudo teve como objetivo identificar e sumarizar evidências referentes à avaliação dos níveis de força muscular (FM) em crianças e adolescentes escolares (≤ 19 anos) no Brasil, com o intuito de atualizar as evidências publicadas anteriormente pelo projeto Report Card Brazil. A busca sistemática das informações foi conduzida em sete bases de dados, restrita aos estudos publicados durante o período de Janeiro de 2018 a Dezembro de 2019. Treze estudos foram incluídos, o que reuniu informações de 10.135 crianças e adolescentes de sete estados brasileiros. Diferentes testes/protocolos para avaliar a FM foram identificados, contudo, a força de preensão manual foi o teste mais empregado pelos estudos (53,8%). A prevalência de crianças e adolescentes que apresentavam níveis de FM considerados saudáveis foi de 29,8% considerando a totalidade de informações, e 27,6% para os meninos e 31,8% para as meninas. Considerando a totalidade de dados revisados pelo projeto Report Card Brazil (informações analisadas neste estudo em adição aos anteriormente publicados), o corpo de informações referente à avaliação dos níveis de FM em crianças e adolescentes no Brasil foram advindas de pesquisas conduzidas durante o período de 2010 a 2019, o que reuniu amostra de 15.208 crianças e adolescentes (sete a 19 anos). De acordo com estas informações, a prevalência de crianças e adolescentes que apresentavam níveis de FM considerados saudáveis nesse período foi de 57,8%, sendo que no sexo masculino foi de 61,1% e no sexo feminino de 58,8%.

Palavras-chave: Saúde do adolescente; Saúde da criança; Monitoramento epidemiológico; Aptidão física.

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The independent and joint associations among muscle strength, abdominal obesity and cardiometabolic variables among adults

Tiago Rodrigues de Lima, David Alejandro González-Chica, Xuemei Sui & Diego Augusto Santos Silva

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ASSOCIATED FACTORS WITH THE ISOLATED AND SIMULTANEOUS PRESENCE OF OVERWEIGHT AND ABDOMINAL OBESITY IN ADOLESCENTS

Fatores associados à presença isolada e simultânea de excesso de peso e obesidade abdominal em adolescentes

Tiago Rodrigues de Lima^{a*} , Mikael Seabra Moraes^a , Joaquim Huaina Cintra Andrade^a ,
Joni Márcio de Farias^b , Diego Augusto Santos Silva^a 

ABSTRACT

Objective: To analyze the sociodemographic and lifestyle factors associated with excessive weight (EW), abdominal obesity (AO) and the simultaneous presence of EW and AO in adolescents from Southern Brazil.

Methods: Cross-sectional study with 583 adolescents (11 to 17 years old) of Criciúma, Santa Catarina, Brazil. EW was assessed by body mass index (BMI) and AO by waist circumference (WC). The independent variables analyzed were gender, age, maternal schooling, balanced diet, physical activity, cigarette use, excessive alcohol use and screen time. Binary logistic regression was used to estimate *Odds Ratios* (OR) and 95% confidence intervals (95%CI).

Results: Boys had 58% higher likelihood of having EW (OR 1.58; 95%CI 1.08–2.29; $p < 0.05$). Younger age group (11 to 14 years) was directly associated with higher likelihood of EW (OR 6.07; 95%CI 4.05–9.11; $p < 0.05$). Adolescents whose mothers had higher education had 75% more likelihood of having AO (OR 1.75; 95%CI 1.01–3.00; $p < 0.05$). Higher likelihood for EW and AO (OR 1.84; 95%CI 1.01–3.34; $p < 0.05$) was identified in younger adolescents (11 to 14 years).

Conclusions: Boys and younger age (11 to 14 years) were associated with a higher likelihood of EW. Adolescents whose mothers studied nine years or more were more likely to have AO. The younger age group (11 to 14 years) was associated with greater chances for the simultaneous presence of EW and AO.

Keywords: Epidemiology; Adolescent health; Risk factors; Public health; Cross-sectional studies.

RESUMO

Objetivo: Analisar os fatores sociodemográficos e do estilo de vida associados ao excesso de peso (EP), à obesidade abdominal (OA) e à presença simultânea de EP e OA em adolescentes do Sul do Brasil.

Métodos: Estudo transversal de base escolar realizado com 583 adolescentes (11 a 17 anos) da cidade de Criciúma, Santa Catarina. O EP foi avaliado pelo índice de massa corpórea (IMC) e a OA, mediante perímetro da cintura (PC). As variáveis independentes analisadas foram sexo, idade, escolaridade materna, dieta balanceada, atividade física, uso de cigarro, uso de álcool em excesso e tempo de tela. Utilizou-se regressão logística binária para estimar as razões de chances (RC) e intervalos de confiança de 95% (IC95%).

Resultados: Os meninos tiveram 58% de chances a mais de terem EP (RC 1,58; IC95% 1,08–2,29; $p < 0,05$). Menor faixa etária (11 a 14 anos) foi diretamente associada a maiores chances de EP (RC 6,07; IC95% 4,05–9,11; $p < 0,05$). Adolescentes cujas mães tinham maior escolaridade apresentaram 75% de chances a mais de terem OA (RC 1,75; IC95% 1,01–3,00; $p < 0,05$). Maiores chances para a simultaneidade EP e OA (RC 1,84; IC95% 1,01–3,34; $p < 0,05$) foram identificadas nos adolescentes de menor faixa etária (11 a 14 anos).

Conclusões: Meninos e menor faixa etária (11 a 14 anos) estiveram associados a maiores chances para EP. Os adolescentes cujas mães estudaram nove anos ou mais apresentaram maiores chances de terem OA. Menor faixa etária (11 a 14 anos) esteve associada a maiores chances para a presença simultânea de EP e OA.

Palavras-chave: Epidemiologia; Saúde do adolescente; Fatores de risco; Saúde pública; Estudos transversais.

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Review Article

Tiago R. de Lima*, Priscila C. Martins, Giuseppe L. Torre, Alice Mannocci, Kelly S. Silva and Diego A.S. Silva

Association between muscle strength and risk factors for metabolic syndrome in children and adolescents: a systematic review

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Abstract: The aim of this systematic review was to identify and summarize evidence for the association between muscle strength (MS) and metabolic syndrome (MetS), and MS and combinations of risk factors for MetS in children and adolescents. Five databases (Medline/PubMed, EBSCO, Scielo, Scopus, and Web of Knowledge) were searched up to November 2019 with complementary reference list searches. Inclusion criteria were studies that investigated the relationship between MS and MetS or MS and combinations of risk factors for MetS in children and adolescents (≤ 19 years of age). Risk of bias was assessed using standard procedures. From the total of 15,599 articles initially identified, 13 articles were included, representing 11,641 children and adolescents. Higher MS values were associated with lower risk for MetS or combinations of risk factors for MetS ($n=11/13$ studies). Of the total of included studies, about 23.1% (03/13) were longitudinal and all included studies were classified as having a moderate risk of bias. This review provides preliminary evidence for a beneficial relationship between MS and MetS among children and adolescents. Additionally, although the body of evidence points to the beneficial relationship between higher MS and lower risk for combination of factors for

MetS in children and adolescents, this relationship is inconclusive.

Keywords: abdominal obesity; blood glucose; cholesterol; HDL; hypertension; physical fitness; triglycerides.

Introduction

Metabolic syndrome (MetS), defined as the combination of risk factors for cardiovascular diseases such as dyslipidemia (triglycerides and HDL-cholesterol), hypertension, glucose intolerance, and excess total adiposity and/or central adiposity [1] represents a global health problem given its increasing prevalence, concomitant with increasing obesity and sedentary lifestyle in children and adolescents [1].

Considered as an important component of health-related physical fitness, regardless of age or clinical condition [2], muscle strength (MS) is an important component for performing any type of movement, including the performance of daily activities. Thus, adequate MS levels have been associated with positive health prognoses [3] and lower risk of developing cardiovascular disease risk factors in the pediatric population [4].

In view of the large number of definitions for MetS in pediatric population [5], great variability in relation to the risk factors adopted, cut-points used and expression of results obtained (dichotomization or continuous score) to diagnose MetS have varied considerably among studies [6]. For this reason, the prevalence of MetS in children and adolescents can vary from 0 to 60% depending on the definition adopted to classify MetS and the population under the study [5].

Although several studies [7–9] have investigated the relationship between MS and MetS or combination of risk factors for MetS in children and adolescents, the results of these studies were divergent, where information regarding the direction of associations for these interrelations is not known. Compiling available evidence through a systematic

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Association between total and regional body fat to bone parameters of university athletes

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Abstract

The purpose of this study was to investigate the association between total and regional body fat to BMD and BMC among university athletes. Cross-sectional study with 167 university athletes (18–35 years). BMD, BMC, body fat total and android, gynoid, arms and legs, and lean tissue mass were obtained using dual X-ray absorptiometry. In male athletes, BMC presented a direct association with total body fat ($\beta=0.134$, CI 0.606, 2.092), android ($\beta=1.065$, CI=0.394, 1.735), gynoid ($\beta=0.059$, CI 26, 0.092), arms ($\beta=1.259$, CI=0.531, 1.988), and legs ($\beta=0.041$, CI 0.017, 0.564). In female athletes, there was a direct association between BMC and total fat ($\beta=1708$, CI 0.585, 2.831), android ($\beta=1.315$, CI 0.488, 2.151), gynoid ($\beta=0.069$, CI 0.026, 0.112), arms ($\beta=0.996$, CI 0.022, 1.971), and legs ($\beta=0.031$, CI 0.004, 0.059). Concluded BMD had no association with total and regional body fat in athletes of both genders. It is concluded that total and regional body fat contributed directly to BMC, but not to BMD in athletes.

Keywords Bone remodeling · Body composition · Subcutaneous fat · Sports · Student health

Introduction

Bone mass is the major determinant of bone fracture risk in adults [1], in which reduced bone mineral density (BMD) and bone mineral content (BMC) values were directly associated with deterioration of the bone tissue macro-architecture and osteoporosis [1, 2]. In contrast, body mass has been described as an important predictor of bone mass, reflecting in part the adaptation of the skeleton to mechanical stress arising from the body's own support, which leads to the formation of new bone structures (osteogenesis) [3].

BMC is the measurement in grams (g) of the amount of bone minerals detected in the entire body or in certain body segments, for example, arms, legs, and spine [4]. BMD measures the density of ores existing in a specific area of bone, and it is quantified by the division between the BMC and the total area. In this quantification, BMC is measured

in grams (g), and the area is quantified in square centimeters (cm^2) [4]. In summary, BMC represents the individual's bone mass or “bone weight”, while BMD represents how “strong” or dense the bone is. In this sense, bone health analysis, using BMD and BMC indicators, is essential in the study of physiological and pathological conditions, demonstrating importance both in clinical contexts, in the diagnosis of osteoporosis, and in sports contexts, as prevention of injuries and fracture risk analysis [5].

The literature brings sufficient evidence that indicate direct relationship between higher body mass and higher bone mass values; however, when body mass is analyzed in a compartmentalized way (fat mass, muscle mass, residual mass), discrepant results in adult populations are evidenced [6–8]. Regarding the association between body fat and bone mass, the literature is not conclusive, as it establishes two directions, in which to some extent the fat mass contributes positively, as it generates an increase in mechanical stress, which favors osteogenic processes to increase mass bone. On the other hand, body fat, when in excess, induces the chronic production of pro-inflammatory cytokines and activation of inflammatory pathways, contributing negatively to bone formation [9, 10].

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ORIGINAL ARTICLE
SPORT CARDIOLOGYClusters of cardiovascular risk factors
and its association with muscle strength in adultsTiago RODRIGUES de LIMA ¹*, David A. GONZÁLEZ-CHICA ², Diego A. SANTOS SILVA ¹¹Research Center in Kinanthropometry and Human Performance, Federal University of Santa Catarina, Florianópolis, Brazil; ²Adelaide Medical School, University of Adelaide, Adelaide, Australia*Corresponding author: Tiago Rodrigues de Lima, Sports Center, Department of Physical Education, University Campus, Federal University of Santa Catarina, Trindade, PO Box 476, 88040-900 Florianópolis, Santa Catarina, Brazil. E-mail: tiago.rodrigues.lima@posgrad.ufsc.br

ABSTRACT

BACKGROUND: Cardiovascular diseases are the leading cause of death globally. The aim of the study was to investigate the relationship between muscle strength (MS) and clusters of metabolic syndrome (MetS) components in adults.**METHODS:** Population-based cross-sectional study comprising 533 adults (45.3±11.1 years) from Florianópolis, Brazil. MS — calculated as the ratio between absolute strength (kgf) and body mass (kg) — was measured by handgrip dynamometry. Data on blood pressure, waist circumference, lipids and blood glucose were used to identify MetS components that were analyzed as individual variables and clusters. Multiple linear regression adjusted was used.**RESULTS:** Individually, MS was inversely associated with all MetS components (1, 2, 3 and 4 factors, β of at least -0.08 kgf/kg). In addition, MS was negatively associated with number of positive MetS components (1, 2, 3 and 4 factors; β of at least -0.05 kgf/kg). Individually or combined in clusters of two, three and four risk factors (β of at least -0.20 kgf/kg), abdominal obesity was directly associated with lower MS values. All combinations of 3 and 4 MetS components (β of at least -0.13 kgf/kg) were inversely associated with MS.**CONCLUSIONS:** Greater number of individual MetS components were related to lower MS values.

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KEY WORDS: Public health; Cardiovascular diseases; Epidemiology; Physical fitness; Metabolic syndrome.

Metabolic syndrome (MetS), a set of adverse health conditions (abdominal obesity, hypertension, dyslipidemia and high blood glucose) has been described as a relevant public health challenge worldwide, given the direct relationship with increased risk for diabetes and cardiovascular diseases.¹ The origin of MetS is unknown, however, aspects related to insulin resistance due to high blood glucose levels¹ or hypertriglyceridemic waist phenotype² play central roles in the genesis of MetS. In addition, aspects related to lifestyle (smoking, inadequate eating habits and sedentary lifestyle)^{1, 3, 4} and genetics⁵ were factors associated with MetS determination.

Among MetS prevention strategies, increased muscle strength (MS) levels have been recommended by pres-

tigious health organizations,^{6, 7} since there is a direct relationship with lower overall risk for diseases, including MetS.⁸ Although the specific mechanisms that explain the interrelationship between MS and MetS are not elucidated, MS is directly associated with increased insulin sensitivity and beta cell metabolism,^{9, 10} aspects that support the occurrence of MetS.¹

Although low MS levels are directly related to MetS, according to literature, some individual MetS components are more positively influenced by reduced MS levels.^{11, 12} In addition, the negative effect on health caused by the clustering of risk factors tends to be greater than the sum of each independent factor,¹³ and although clusters of these components may coexist in the same individual, in-



Effects of community-based interventions on physical activity levels: systematic review

Efeitos de intervenções comunitárias nos níveis de atividade física: revisão sistemática

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ABSTRACT

Aiming to evaluate the effects of community-based interventions on the physical activity (PA) levels in adults, in December, 2017 a systematic review was developed in five electronic databases (Pubmed, Physical Education Index, Scopus, Sportdiscus e Web of Science) and in reference lists, looking for community-based randomised controlled trials (RCT) with interventions aimed at PA increasing levels assessed by objective methods in samples of adults. Risk of bias was assessed using an adapted version of the EPHPP instrument. Of 3,223 articles initially identified, nine composed the descriptive synthesis. Most interventions focused on inactive people and women. In view of the heterogeneity between the PA indicators, a descriptive synthesis of the data was chosen, thus, considering number of steps per day, four of five interventions showed statistically positive results. In regard of moderate-to-vigorous PA levels, two of five interventions showed potential results. Most of interventions were based on educational activities as practices of counselling, home visits and telephone support. Articles with moderate risk of bias were the majority in four of the five domains assessed. In conclusion, most of the studies included showed the potential of community-based interventions to increase the number of steps per day. It is important that future studies discuss operational strategies of interventions, such as counselling and home visits.

Keywords: Physical activity; Adult; Public health; Randomized controlled trial; Review.

RESUMO

Com o objetivo de avaliar os efeitos de intervenções comunitárias nos níveis de atividade física (AF) em adultos, em dezembro de 2017 foi desenvolvida uma revisão sistemática, buscando ensaios controlados randomizados (ECR) comunitários com intervenções voltadas à promoção da AF avaliadas por métodos objetivos em amostras de adultos. Ao todo, nove ECR compuseram a síntese descritiva. A maioria dos ECR foi direcionada às pessoas inativas e mulheres. Considerando o número de passos por dia, quatro das cinco intervenções apresentaram resultados estatisticamente positivos. Em relação aos níveis de AF moderadas e vigorosas, duas de cinco intervenções apresentaram resultados potenciais. A maioria das intervenções foi baseada em atividades educacionais como práticas de aconselhamento, visitas domiciliares e chamadas telefônicas. Em conclusão, a maioria dos estudos incluídos mostrou o potencial das intervenções comunitárias ao aumento do número de passos por dia. É importante que futuros estudos debatam estratégias operacionais das intervenções, como o aconselhamento e visitas domiciliares.

Palavras-chave: Atividade física; Adulto; Saúde pública; Ensaio controlado randomizado; Revisão.

Introduction

Although physical activity (PA) contributes to the prevention and/or control of a large number of diseases¹⁻⁴ and is associated with a reduction in the risk of premature death⁵, approximately 31% of the world adult population does not reach recommended levels of moderate and vigorous PA⁶. In view of its global dimension⁶ it is also recognized that PA is multi-determined by socioeconomic and environmental variables⁷, which raises the importance of studying the

particularities of contexts where strategies to promote PA can be implemented.

Apart from the impossibility of better control over contextual variables, in comparison with clinical-based interventions, previous evidence suggests the potential of community-based strategies for health promotion and prevention of diseases⁸⁻¹⁰. Regarding PA promotion, a previous review¹¹ argues about the inconclusiveness of the effects of the community-based interventions, much due to the high methodological

Healthy lifestyle moderates the relationship between cardiovascular disease with blood pressure, body composition, carotid intima-media thickness, and glycated hemoglobin among adults

Tiago Rodrigues de Lima, David Alejandro González-Chica, Yara Maria Franco Moreno, and Diego Augusto Santos Silva

Abstract: We investigate whether the adherence to healthy lifestyle recommendations (regular physical activity, healthy diet, reduced alcohol consumption, nonsmoking) moderates the relationship between cardiovascular disease (CVD) and its risk factors (obesity, diabetes, dyslipidemia, and hypertension) with clinical variables among adults. This cross-sectional population-based study comprised 862 adults (39.3 ± 11.4 years, 46.4% men) from Florianópolis, Brazil. Clinical variables were systolic (SBP) and diastolic blood pressure, waist circumference, body mass index (BMI), percentage of body fat, muscular strength, carotid intima-media thickness (IMT), high sensitive C-reactive protein, and lipid and glucose metabolism markers. Multiple linear regression adjusted for confounding factors was used. Reduced IMT and HbA1c were observed in males with CVD or its risk factors who adopted healthy lifestyle recommendations ($p < 0.001$), and lower SBP levels were observed in females without CVD or its risk factors ($p = 0.034$). Females with CVD or its risk factors who followed healthy lifestyle recommendations showed higher BMI ($p = 0.035$). Adherence to number of healthy lifestyle recommendations moderated cardiovascular health in adults with CVD and without CVD.

Novelty

- The adherence to healthy lifestyle recommendations moderated the relationship between IMT and HbA1c with CVD or its risk factors among males.
- The lower values of SBP among females without CVD or its risk factors were moderated by the adherence to healthy lifestyle recommendations.

Key words: diet, alcohol drinking, smoking, exercise, carotid intima-media thickness, C-reactive protein, muscle strength.

Résumé : Nous vérifions si l'observation des recommandations pour un mode de vie sain (activité physique régulière, alimentation saine, réduction de la consommation d'alcool, pas de tabac) modère la relation entre les maladies cardiovasculaires (« CVD ») ainsi que leurs facteurs de risque (obésité, diabète, dyslipidémie et hypertension) et des variables cliniques chez les adultes. C'est une étude transversale de la population portant sur 862 adultes ($39,3 \pm 11,4$ ans, 46,4 % d'hommes) de Florianópolis au Brésil. Les variables cliniques sont la tension systolique (« SBP ») et diastolique, le tour de taille, l'indice de masse corporelle (IMC), pourcentage de graisse corporelle, la force musculaire, l'épaisseur intima-média carotidienne (« IMT »), la protéine C réactive à haute sensibilité, les marqueurs du métabolisme des lipides et du glucose. On utilise la régression linéaire multiple ajustée pour les facteurs de confusion. Des IMT réduites et de l'HbA1c sont observés chez des hommes à risque ou atteints de maladie cardiovasculaire qui adoptent des recommandations relatives à un mode de vie sain ($p < 0,001$); des valeurs de SBP inférieures sont observées chez des femmes ne présentant pas de risque ni de CVD ($p = 0,034$). Les femmes présentant un risque ou une CVD qui suivent les recommandations d'un mode de vie sain présentent un IMC plus élevé ($p = 0,035$). L'adhésion à un nombre de recommandations relatives à un mode de vie sain atténue la santé cardiovasculaire chez les adultes aux prises ou non avec une CVD. [Traduit par la Rédaction]

Les nouveautés

- L'adhésion aux recommandations relatives à un mode de vie sain atténue chez les hommes la relation entre l'IMT et l'HbA1c avec les CVD ou les facteurs de risque.
- Les valeurs plus faibles de SBP chez les femmes sans CVD ni facteurs de risque sont atténués par l'adhésion aux recommandations relatives à un mode de vie sain.

Mots-clés : régime alimentaire, consommation d'alcool, tabagisme, exercice physique, épaisseur de l'intima-média carotidien, protéine C-réactive, force musculaire.

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Muscular strength and cardiovascular risk factors in adults: a systematic review

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Tabagismo e consumo de álcool em adolescentes de uma cidade de pequeno porte do Brasil

Smoking and alcohol consumption in adolescents from a small city in Brazil

Fumar y consumo de alcohol en adolescentes de una pequeña ciudad de Brasil

Adelson Fernandes da Silva^{1*}, Lais Castilho Xavier², Larissa Ferreira dos Santos², Maria Clara Álvaro Santos², Salete Aparecida Duarte Figueiredo², Deyvid Rafael Dias Carvalho², Felipe Galdino Souza², Nívea Maria de Oliveira Jacques¹, Tiago Rodrigues de Lima³, Diego Augusto Santos Silva³.

RESUMO

Objetivo: Estimar a prevalência e os fatores sociodemográficos associados ao tabagismo e ao consumo de álcool em adolescentes escolares residentes em uma cidade de pequeno porte do Brasil. **Métodos:** Estudo transversal, conduzido em 583 escolares de 15 e 18 anos, de escolas públicas estaduais. Os dados foram coletados através do questionário “Estilo de Vida dos Adolescentes Manauara”. **Resultados:** Maiores chances (OR: 4,26; IC95%: 1,31-13,82) de ser ex-fumante foram verificadas nos escolares que residiam em áreas rurais. Além disso, ser do sexo masculino (OR: 5,18; IC95%: 1,39-19,28), estar na faixa etária de 17-18 anos (OR: 1,96; IC95%: 1,16-3,30) e estudar no turno de estudo vespertino (OR: 7,66; IC95%: 1,62-36,24) foi relacionado com maiores chances de ser fumante. Os adolescentes de faixa etária 17 à 18 anos tiveram 113% mais chances de consumirem álcool de maneira excessiva (OR: 0,37; IC95%: 0,25-2,78). **Conclusão:** A prevalência estimada para tabagismo foi inferior comparado ao consumo de álcool. Os subgrupos de adolescentes que tiveram maiores chances de fumar e consumir álcool, foram os escolares do sexo masculino com a faixa etária 18-19 anos.

Palavras-Chave: Álcool, Tabagismo, Escolares.

ABSTRACT

Objective: To estimate the prevalence and sociodemographic factors associated with smoking and alcohol consumption in school adolescents living in a small Brazilian city. **Methods:** Cross-sectional study conducted in 583 schoolchildren aged 15 to 18 years of state public schools. Data were collected through the questionnaire “*Estilo de Vida dos Adolescentes Manauara*” (Lifestyle of Adolescents Manauara 2011). **Results:** Higher odds (OR: 4.26; 95%CI: 1.31-13.82) of being an ex-smoker were found in schoolchildren who lived in rural areas. In addition, being male (OR: 5.18; 95%CI: 1.39-19.28), being in the 17-18 age group (OR: 1.96; 95%CI: 1.16-3.30) and studying in the afternoon study shift (OR: 7.66; 95%CI: 1.62-36.24) was associated with greater odds of being a smoker. Adolescents aged 17 to 18 years were 113% more likely to consume alcohol excessively (OR: 0.37; 95%CI: 0.25-2.78). **Conclusion:** The estimated prevalence for smoking was lower compared to alcohol consumption. The subgroups of adolescents who were more likely to smoke and consume alcohol, were male students aged 18-19 years.

Keywords: Alcohol, Smoking, Schooling.

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The independent and joint associations between muscle strength, health variables and cardiovascular disease among adults

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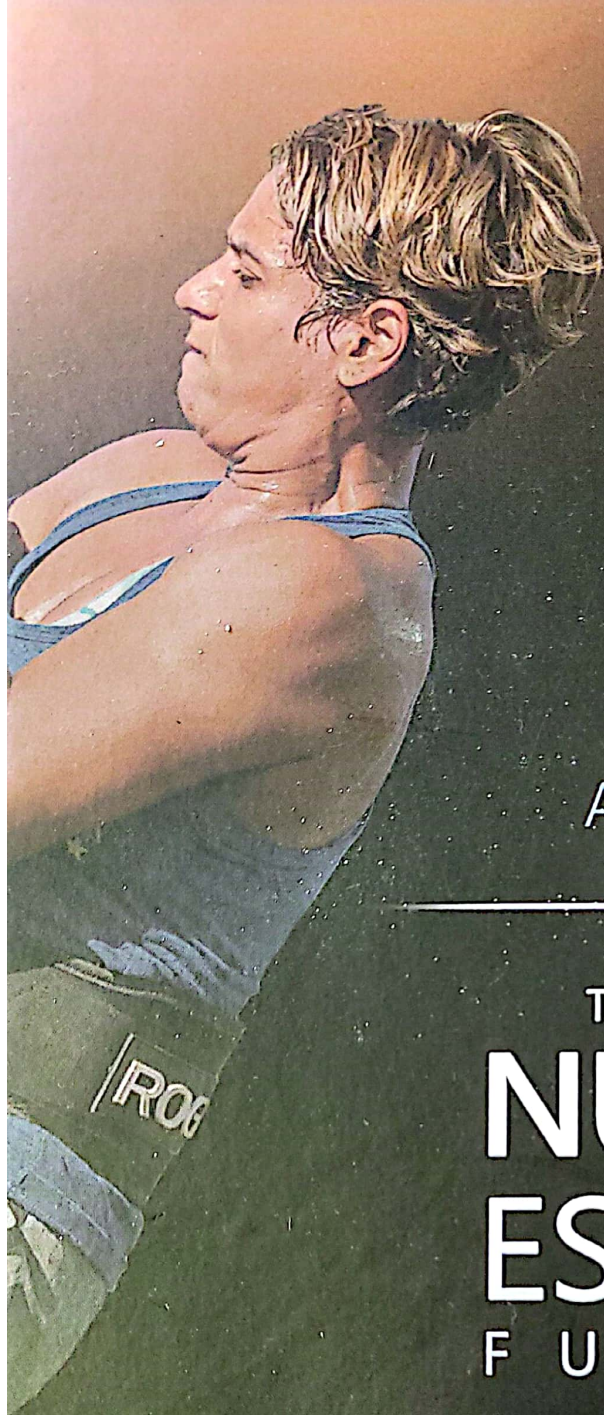


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Capítulo de livro



ANDRÉIA NAVES

TRATADO DE
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SEGUNDA EDIÇÃO



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Eliane Cristina de Andrade Gonçalves, Mikael Seabra Moraes,
Priscila Custódio Martins, Tiago Rodrigues de Lima,
Braian Cordeiro e Valden Capistrano

Introdução

O estudo da composição corporal humana é um ramo da biologia humana que enfoca a quantificação *in vivo* dos componentes do corpo, as relações quantitativas entre componentes e as mudanças quantitativas nos componentes relacionadas a vários fatores de influência.¹

A ideia de que o corpo humano é formado por diferentes tecidos data da época do pai da Medicina, Hipócrates, por volta de 440 a.C., o qual advogava que o corpo era formado por diferentes tecidos. No entanto, naquela época a realização de estudos mais aprofundados era impossibilitada pela falta de aparato tecnológico.²

O químico alemão Justus von Liebig (1803 a 1873) foi o pioneiro a descobrir que as substâncias presentes na comida estavam no corpo humano. Ele também descobriu que os fluidos corporais continham mais sódio e menos potássio do que os tecidos. O trabalho dele, baseado em análise química, marcou o começo dos estudos modernos sobre a composição corporal humana.²

Desde então, o estudo da composição corporal ganhou um robustez de evidências que levou a sua classificação em três áreas de investigação: regras da composição corporal; estudos de metodologia; estudos das alterações da composição corporal.²

As regras da composição corporal foram o primeiro campo de investigação, cujo principal objetivo era quantificar e estabelecer relações entre diferentes componentes do corpo. O estudo com cadáveres foi fundamentalmente importante nessa área de investigação. Em 1843, Schwann foi dos primeiros a mensurar cadáveres buscando encontrar algum tipo de relação entre os diferentes componentes. Essa iniciativa permitiu que estudos e análises químicas subsequentes estabelecessem tais relações.²

Um dos objetivos dos estudos sobre metodologia da composição corporal é encontrar técnicas de mensuração da composição corporal. O primeiro componente corporal estimado por um método *in vivo* foi o músculo esquelético. A excreção diária de creatinina urinária foi utilizada em 1909, por Shaffer e Coleman, como índice de massa total do músculo esquelético.²