

Ethics committee approval: Federal University of Triangulo Mineiro – CAAE 64990022.9.0000.5154.

<https://doi.org/10.1016/j.bjpt.2024.100926>

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CONTRIBUTIONS OF THE AXIAL AND SAGITTAL TORQUES OF THE TRUNK TO THE FORWARD DISPLACEMENT OF THE LOWER LIMB AT DIFFERENT RUNNING SPEEDS

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Background: Trunk axial and sagittal torques have been studied as important motors for lower limb movements in tasks such as kicking. Trunk torques are potential contributors to lower limb forward displacement during the swing phase of running in the kinetic chain. In the swing phase of running, the lower limb is initially accelerated forward and subsequently decelerated before contact with the ground. The torques produced by the trunk muscles could contribute, together with the muscles of the lower limb joints, to this function, being important to avoid overloading the muscles of these segments during running. However, there are no investigations in the literature about the contributions of trunk torques to lower limb advancement in running.

Objectives: The aim of the study is to understand the accelerations caused by the axial and sagittal torques of the trunk on the segments of the lower limb, during running, at different speeds.

Methods: Three running cycles with the right lower limb at speeds of 2m/s, 3m/s, 4m/s and 5m/s were used to perform the induced acceleration analysis in the OpenSim software. The sample consisted of ten experienced, healthy male runners. Data were collected on an instrumented treadmill at Stanford University's Human Performance Laboratory and are freely available. A model of the musculoskeletal system allowed estimating the accelerations caused by joint torques in body segments. The anteroposterior accelerations of the thigh, shank and foot segments, induced by axial and sagittal torques of the trunk and sagittal torques of the hip, knee and ankle, were computed. For each segment, the movement was divided into acceleration and deceleration phases. The percentage of the total acceleration induced by the torques was determined by means of the positive and negative integral.

Results: Axial trunk torque was the main inducer of thigh acceleration (63% to 67%), while sagittal trunk torque was the main inducer of deceleration (45% to 57%), at all running speeds. For acceleration and leg deceleration, the hip in the sagittal plane was the main inducer torque (67% to 82%), while for the foot, the sagittal ankle torque was the main acceleration inducer (39 to 49%), while the sagittal torque of the knee was the main deceleration inducer (95% to 98%). The contribution pattern remained independent of running speed.

Conclusion: It is concluded that the trunk axial and sagittal torques contribute to the acceleration and deceleration of the thigh, which is the segment with the greatest mass and inertia of the lower limb, regardless of running speed.

Implications: The study helps in understanding human movement by exploring the effects of torques on joints and segments distal to

them. Thus, trunk torque production deficits could overload hip flexor and extensor muscles to accelerate and decelerate the thigh. The study serves as a basis for intervention studies on the trunk and running performance.

Keywords: Running, Trunk, Induced acceleration analysis

Conflict of interest: The authors declare no conflict of interest.

Acknowledgment: We thank the funding bodies FAPEMIG, Capes and Cnpq for their support and authors Hamner, SR, Seth, A, and Delp, SL for free access to the database.

Ethics committee approval: According to the authors of the database, data collection was approved by the research ethics committee on Graduate Studies of Stanford University and all participants consented to participate.

<https://doi.org/10.1016/j.bjpt.2024.100927>

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EPIDEMIOLOGICAL PROFILE AND MAIN MUSCULOSKELETAL INJURIES THAT AFFECT BODYBUILDERS

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Background: It is known that bodybuilding is a safe and effective way to perform exercises, although it is not risk-free. Its main risks for the musculoskeletal system revolve around joint overloads through repetitive use and failure in technical execution. Bodybuilding is one of the most common forms of physical activity. In view of this prior context and the lack of information about injuries suffered by bodybuilders, it is necessary to identify their possible risk factors, which may contribute to injury prevention planning in the future.

Objectives: The objective of the present study was to identify the sociodemographic and epidemiological profile of bodybuilders, as well as the main injuries affected in this public.

Methods: An observational, cross-sectional study was carried out. An online questionnaire was applied through the google forms platform, the inclusion criteria being Residents of the state of São Paulo, who practice bodybuilding in the state of São Paulo on a recreational or professional basis between 18 and 65 years old. The SPSS software was used to calculate the average and percentage in the presentation of the results.

Results: The study analyzed the results of 100 bodybuilders, predominantly aged between 18 and 25 years, most of whom were students or professionals in the field of biological sciences (47%), sleeping more than 6 hours a night (64 %), training in large branches (54%) 3 or 5 times a week (59%) with the main objective of hypertrophy (49%). The prevalence of injuries was 43%, with the shoulder (51%), lumbar spine (39.5%) and knee (27.9%) being the most affected site. 51% of the injuries are classified as overload injuries, reaching yet another profile of practitioners who set up their own training (46.5%).

Conclusion: The sociodemographic and epidemiological profile of bodybuilders in the study was homogeneous between genders, aged between 18 and 25 years, with a height of 1.69 m and a predominantly overweight BMI. Bodybuilding or +1 associated sport was practiced, who slept more than 6 hours a night with a hypertrophy goal. The prevalence of injuries among bodybuilders was 43%, with the most affected sites being the shoulder, lumbar spine and knee.

Implications: The study brings epidemiological data and musculoskeletal injuries in gym practitioners and their training routine, being important to understand the public due to the scarcity of

studies in this area in Brazil. In this way, the data are relevant for researchers to carry out future studies and analyze risk factors associated with their practice, through descriptive data on bodybuilding. And the data is relevant for clinicians to take into account in their rehabilitation plans.

Keywords: Resistance training, Bodybuilding, Injuries

Conflict of interest: The authors declare no conflict of interest.

Acknowledgment: I would like to thank all the professors at FMU who taught me a bit of research to finish my Scientific Initiation.

Ethics committee approval: Faculdades Metropolitanas Unidas CAAE: 55815622.1.0000.5450

<https://doi.org/10.1016/j.bjpt.2024.100928>

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CHARACTERIZATION AND THERAPEUTIC APPROACHES TO URINATION DYSFUNCTIONS IN INDIVIDUALS WITH CEREBRAL PALSY

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Background: Individuals with cerebral palsy may be affected by motor, sensory, behavioral and/or autonomic dysfunctions. Among the autonomic dysfunctions, those that affect the urinary tract are very prevalent, with emphasis on the neurogenic bladder. Neurogenic bladder reflects findings of loss of inhibition of detrusor hyperactivity, generating voiding dysfunctions. Such dysfunctions are very frequent; however, their characteristics and approaches have been little systematized in the literature.

Objectives: To present the evidence from the literature that characterize voiding dysfunctions associated with cerebral palsy and the therapeutic approach.

Methods: A systematic review was performed following PRISMA recommendations with the research question structured according to population, intervention, control, and outcome. Two reviewers independently performed searches using the descriptors cerebral palsy' and 'neurogenic urinary bladder' in Portuguese, Spanish and English in Bireme (Lilacs, Medline, Scielo), Cinahl, Cochrane, Pubmed and Web databases of Science, no filters. Only published studies were included that included a sample of individuals diagnosed with cerebral palsy, with data on functional characteristics of the urinary tract and/or treatment. Studies that presented individuals with cerebral palsy and other associated diagnoses and studies with the design of reviews, letters or in the protocol phase were excluded.

Results: 1314 studies were found and 14 were selected (7 cross-sectional studies and 7 cohort studies). The total sample consisted of 1121 individuals with a mean age of 13.12 ± 8.91 years. The classification showed spastic quadriplegia (n=213), spastic diplegia (n=163), spastic hemiplegia (n=86) and 4 studies did not include classifications. The studies showed as main urinary tract symptoms urge incontinence (64.28%), daytime urinary incontinence (57.14%), stress urinary incontinence (35.71%), enuresis (35.71%), infection urinary tract (28.57%). There was also evidence of a reduction in urinary frequency, voiding fullness, voiding effort, voiding unpredictability, reduction of tension and force of voiding jet, inconstant jet. The therapeutic approach was always linked to the use of medication.

Conclusion: Voiding disorders in individuals with cerebral palsy are characterized by the association of symptoms related to failures in filling and/or emptying the bladder and have been therapeutically addressed only from a symptomatic point of view.

Implications: From a scientific point of view, considering the frequency of urinary dysfunctions, this review presents the urgent need to carry out studies with good methodological parameters that involve evaluation and, above all, other forms of treatment, such as, for example, pelvic physiotherapy. From a clinical point of view, this study directs the evaluative practice to conditions of hyperactivity of the detrusor musculature.

Keywords: Cerebral palsy, Neurogenic urinary bladder, Urinary incontinence

Conflict of interest: The authors declare no conflict of interest.

Acknowledgment: Not applicable.

Ethics committee approval: Not applicable.

<https://doi.org/10.1016/j.bjpt.2024.100929>

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RHEUMATOID ARTHRITIS: ASSESSMENT OF CARDIOPULMONARY FITNESS USING NEW SAMPLING TECHNOLOGY

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Background: Although maximum oxygen consumption (VO2peak) is one of the most important measurements in clinical practice, the high cost, time consumption and complications associated with the test have led to the search for simpler devices and the development of equations for estimating of cardiopulmonary fitness (eACP). Since the lungs are one of the sites most affected by rheumatoid arthritis (RA).

Objective: to create a predictive equation for VO2peak obtained by simple sampling technology in women with RA-associated interstitial lung disease (RA-ILD) considering the variables related to pulmonary involvement.

Methods: This cross-sectional study evaluated 47 women with RA-IPD. The participants were submitted to the following evaluations: dosage of autoantibodies; chest computed tomography (CT); assessment of disease activity through the Clinical Disease Activity Index (CDAI); measurement of physical function through the Health Assessment Questionnaire disability index (HAQ-DI); lung function tests including spirometry, carbon monoxide diffusing capacity (DLco) measurement, single-breath nitrogen washout test (N2SBW), impulse oscillometry (IOS) and cardiopulmonary exercise testing (CPET) using the FitMateTM®.

Results: VO2peak was significantly correlated with age ($r=-0.550$, $p<0.0001$), rheumatoid factor ($r=-0.443$, $p=0.002$), anti-cyclic citrullinated peptide antibodies (anti-CCP, $r=-0.410$, $p=0.004$), CDAI ($r=-0.462$, $p=0.001$), HAQ-DI ($r=-0.486$, $p=0.0005$), forced vital capacity ($r=0.491$, $p=0.0004$), DLco ($r=0.621$, $p<0.0001$), phase III slope of the N2SBW test ($r=-0.647$, $p<0.0001$), resonance frequency (Fres, $r=-0.717$, $p<0.0001$), respiratory system reactance ($r=-0.535$, $p=0.0001$), and inhomogeneity of respiratory system resistance between 4-20 Hz ($r=-0.631$, $p<0.0001$). On CT scan, patients with extensive ILD had significantly lower VO2peak than patients with limited ILD ($p<0.0001$). In the multivariate regression analysis, Fres, DLco and age explained 61% of the VO2peak variability.

Conclusion: As assessed by CPET, women with RA-ILD show reduced ACP, which can be explained at least in part by the presence of small