Relationship between Body Mass Index, Cardiorespiratory and Musculoskeletal Fitness

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Abstract:-

Cardiorespiratory and musculoskeletal fitness are important health indicators that help optimal physical functioning. Understanding the relationship between weight index and these health markers may add to the improvement of proof based interventions to address obesity-related complications. The relationship between weight index, cardiorespiratory and musculoskeletal fitness has not been very much investigated, particularly in female adolescents. The aim of this examination was to investigate the association between weight index, cardiorespiratory and musculoskeletal fitness among South African adolescent young ladies in low-income networks. Strategies: This cross-sectional examination included 151 adolescent young ladies, aged 13–16 years. Cardiorespiratory fitness was measured using the 20 m transport run test and musculoskeletal fitness was assessed using a variety of field-based tests. Stature and weight were measured with standardized methods and weight index (BMI) was inferred by the formula [BMI = weight (kg)/tallness (m)2]. Participants were categorized into three BMI gatherings using the International Obesity Task Power age-and sexual orientation explicit cut-off points. Pearson correlations were utilized to determine the association between weight index, cardiorespiratory fitness and measures of musculoskeletal fitness at $p \leq 0.05$. Results: Overweight and hefty young ladies were found to have lower cardiorespiratory fitness, decreased lower furthest point muscular strength, greater hold strength, and more hypermobile joints compared to normal-weight peers. BMI was negatively associated with cardiorespiratory fitness and lower furthest point muscular strength. Ends: The findings indicate that increased weight correlates with decreased cardiorespiratory and musculoskeletal fitness. Interventions ought to be created to target these important segments of physical fitness in this demographic gathering.

Keywords:- adolescents; body mass index; cardiorespiratory fitness, body mass index; adolescents; low-income settings

INTRODUCTION:-

A rescue firefighter (FF) is primarily tasked to save lives whilst maintaining his safety. In various crises, rescue FFs wearing personal defensive hardware are the principal gathering to arrive and perform physical demanding activities1. Their aptitudes, actions and decisions are important during critical situations whilst protecting the people in question and the team2. Past examinations revealed that FFs are presented to a higher incidence of musculoskeletal injuries, overexertion, substandard physical fitness, cardiovascular incidences3, muscular sprains and strains as well as ligament, ligament and join tinjuries4. Considering all complexities including injuries and occupation demand, FFs ought to have great physical fitness, which includes great cardiorespiratory capacity, muscle strength or resistance and Body Piece (BC)5,6.

Smith7 recommended that FFs are required to have large amounts of aerobic fitness, anaerobic capacity, muscular strength and endurance. In any case, the high prevalence of overweight (79.5%) and obesity (33.5%) among (US) FFs indicates the above statement as a false assumption8. This false assumption has also been demonstrated in different past investigations among US FFs and Brazilian FFs, in which a high prevalence of overweight and obesity is reported9-12. Nogueira et al.11 found that obesity is related to bring down cardiorespiratory fitness among Brazilian FFs compared with the non-corpulent gathering. A similar increased pattern of overweight and obesity prevalence exists among the Malaysian armed powers staff. The prevalence of overweight and obesity among the Royal Malaysian Navy (RMN)13 are 29.3 and 7.2%, separately and that among the Malaysian Army (MA) are 32.8 and 9.3%, respectively14.

Baur et al.15 and Durand et al.16 detailed that high physical fitness of FFs is significantly associated with lower Muscle versus fat (BF) and Weight Index (BMI). In addition, Michaelides et al.17 found an association between increased BMI, BF, Waist Circuit (WC), age and declining of fitness performance in US FF. According to Poplin et al.18, far reaching fitness can be evaluated based on cardiorespiratory fitness, muscular strength, endurance, adaptability and BC to anticipate the risk of injury. Individuals with lower extensive fitness status have been accounted for to have a higher risk of injury compared with fit individuals18.

A positive FF work performance is associated with an improvement of the physical fitness level17,5. Past examinations indicated that physiological factors are related to the performance of occupational task and can be measured. Health and ability related fitness parts are mainly used to measure physical fitness performance19. The health-related part includes muscular strength, muscular endurance, adaptability and cardiorespiratory. The expertise related part is separated into agility, balance, coordination, speed, power and reaction. Each of the physical

fitness components has an important capacity that influences performance effectiveness and anticipates injuries among FF personnel1.

To date, several tests have been utilized by local groups of fire-fighters in many nations to screen for minimal physical capabilities, occupational qualification, necessities and performance in potential FF candidates17,20. For example, the candidate physical ability test, ability test and Individual Physical Capability Test (IPPT) are utilized as basic fitness parameters among North American FFs, Italian FFs and Malaysian FFs (MFFs), separately. According to Atikah et al.1, these physical tests are important to help health practitioners and businesses to distinguish health-related issues to create and execute wellbeing programs. Since, physical fitness, healthy way of life and anticipation against injuries during on-work performance are important to MFF, this investigation was led to assess BC and physical and aerobic fitness among FF faculty in Selangor, Malaysia and to determine the correlation between the variables contemplated.

Further, obesity is known to impair physical fitness and academic performance [13–15]. Several factors have been postulated to explain how obesity advances decreased physical fitness. In the first place, hefty kids have low degrees of physical activity compared to non-fat companions [16]. Subsequently, they have less chance to create motor abilities which causes further participation confinements and muscle deconditioning [17–19]. Compared to non-corpulent friends, hefty kids will in general avoid weight-bearing tasks (e.g., walking, running) because of the high vitality cost associated with such activities. This leads to poor musculoskeletal and cardiorespiratory fitness [20]. Besides, it has been recommended that obesity-related fitness impairments are caused by neuromuscular brokenness resulting from metabolic imbalance [21]. The association among obesity and academic performance is implied to be influenced by factors, for example, poor companion relationships, low-confidence, and decreased psychological abilities [13]. In spite of the fact that obesity is known to negatively impact physical performance, the nature of the relationship between weight index (BMI) and aspects of physical fitness is less clear, particularly among female adolescents from low financial backgrounds. Given the present interest in adolescent health [22] and the increased prevalence of adolescent obesity in LMIC [3], examining the association between BMI, cardiorespiratory and musculoskeletal fitness may give chances to identifying effective interventions for reducing obesity-related complications. Several investigations have recorded an inverse relationship among BMI and cardiorespiratory fitness [10,14,23–26]. Higher BMI has a negative influence on musculoskeletal fitness [27]. Improved cardiorespiratory and musculoskeletal fitness (MSF) are each associated with better health results [13–15]. MSF encompasses those segments of physical fitness in charge of fruitful execution of motor tasks, for example, walking and running

[28], and includes measures, for example, muscular strength and endurance, adaptability and joint versatility [29]. Lower levels of MSF are associated with higher BMI in school-aged kids [6]. Despite the fact that these patterns are believed to be sexual orientation subordinate [30], the majority of existing data are based on preadolescent offspring of both genders. Proof of the association between BMI, cardiorespiratory and MSF in female adolescents is restricted. Past examinations were directed among kids from high-income nations. It is unclear if findings from such examinations can be extrapolated to populations in low-income settings. It is conceivable that the association between these factors may differ for populations in different settings. Without better understanding of how BMI relates to cardiorespiratory and MSF, health professionals may be less effective at promoting physical health in adolescent populations. Examining the relationship between BMI, cardiorespiratory and MSF in female adolescents would broaden the group of information. Subsequently, the motivation behind this investigation was to determine the association between BMI, cardiorespiratory and MSF among female adolescents attending school in a low-income network of Cape Town, South Africa. It was estimated that participants with higher BMI would have decreased cardiorespiratory and MSF than normal-weight peers.

MATERIALS AND METHODS:-

Ethical approval and authorization letter: This investigation pursued all the guidelines and systems approved by the research morals board of trustees of University Kebangsaan Malaysia (reference No. UKM 1.5.3.5/244/FST-2015-007). A composed authorization letter was obtained from the Flame and Rescue Department of Selangor, Malaysia [reference No. JBPM/SL/OPS:100-2/7/14 Jld 1 (56)] to visit and lead the investigation among the FFs.

Sampling and study location: This cross-sectional investigation was carried out among August and November, 2015 at 9 randomly chosen flame and rescue departments in Selangor, Malaysia. The flame and rescue stations chose are located in Serdang, Bangi, Kajang, Shah Alam, Kuala Lumpur International Airport, Cyberjaya, Petaling Jaya and Puchong. A total of 230 subjects finished all parameters in this examination. The participants were rescue male FFs aged between 20-39 years. The FFs who had past history of musculoskeletal injuries were rejected from the investigation. Subjects were advised on the examination methods and assent structures were obtained before participation.

Anthropometric and BC measurements: The tallness of the participants was measured to the nearest 0.1 cm without shoes using the SECA body meter (Model 208, Seca, Germany). Body weight was straightforwardly measured to the nearest 0.1 kg using the weighing capacity of the Tanita TBF-300A muscle versus fat analyzer (Tanita Corp., Japan). The weight of the uniform was deducted during the measurement. The BC was measured simultaneously with

body weight using the muscle to fat ratio analyzer. Based on the bioelectrical impedance analysis (Tanita TBF-300A), the ideal cut-off point for BF is 14-23%. Preceding measurements, the subjects were instructed to fast for 4-5 h, avoid heavy physical activity for 12 h, guarantee normal state of hydration and avoid utilization of any alcoholic and caffeinated drinks for 24 h.

Conclusions:- Overweight and fat young ladies have decreased cardiorespiratory and musculoskeletal fitness as compared to normal-weight peers. More research endeavors ought to be coordinated towards developing interventions with the goal of improving these important segments of physical fitness in this demographic gathering. This may counteract or delay the movement of long haul health complications.

Given that overweight and large female adolescents demonstrate decreased lower furthest point strength and cardiorespiratory fitness, we recommend that light-intensity, meaningful and fun activities involving the utilization of everyday tasks with optimal joint loading ought to be investigated. Due to the functional issues recognized in this gathering, lively intensity activities (e.g., running) and complex games may be excessively challenging and could decrease enthusiasm. Subsequently, using familiar activities like walking over obstacles, controlled lurches, and engine aptitudes instruction, may be regarded enjoyable and could increase compliance. Along these lines, an activity approach that allows for adequate improvement of engine skill, strength and cardiorespiratory fitness in a motivating environment may demonstrate to be valuable for preparing these young ladies for usual physical education programs.

This examination assessed physical fitness using basic IPPT test, aerobic fitness and BC of FFs. All physical fitness segments were significantly correlated with BF, BMI and body weight. Nonetheless, aerobic fitness was not significantly correlated with BC, BMI and body weight. The aerobic fitness among Malaysian FFs was adequate to advance health. The consequences of this investigation can be utilized to educate Malaysian FFs the importance of BC segments to improve their activity performance. The FFs should give extra concentrate on their BF, BMI and weight status. In this way, health-related programs ought to be intended to lessen BF and maintain great BC among Malaysian FFs as they influence their performance

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