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RESEARCH ARTICLE

CORRELATION OF PHYSICAL FITNESS INDEX WITH BODY MASS INDEX : A CASE CONTROL STUDY

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Abstract: ***AIM:*** The aim of the present study is to evaluate the cardiac and pulmonary fitness among obese subjects and healthy subjects. ***METHODS:*** A total of 170 participants were included with age groups between 18-35 yrs . Physical Fitness Index was assessed by using Harvard Step Test. ***RESULTS:*** Heart rate, systolic Blood pressure, diastolic blood pressure had a significantly association in obese subjects. Biochemical markers such as uric acid ,Tg and cholesterol had significantly higher in obese adult compare to non-obese adult. HST had a positive correlation with the obese subject compare to non obese young adult. CONCLUSION: Poor health outcomes are linked to both physiological and biochemical changes in the obese subject. Increased obesity in young adult showing negatively affects vascular adaptability.

Keywords: Tg (Triglyceride), Serum Uric acid (sUA), Harward step test (HST).

INTRODUCTION

The World Health Organization states that engaging in both moderate and intense physical activity is suggested to enhance health. [1] Another risk factor for inactivity is being overweight, which raises blood pressure. Regular exercise, however, can assist those with hypertension avoid it and lower their blood pressure [2]. Engaging in physical activity can help you achieve this level of fitness. Physical fitness, according to the American College of Sports Medicine, is the ability to do daily tasks without experiencing excessive fatigue. A person who is physically active has a lower chance of getting sick and a higher chance of reaching their goals, both personal and professional [3] .

One method for assessing physical fitness is the Harvard Step Test, developed by Brouha at the Harvard Sports Laboratory. The evaluation involved heart and lung function through bench tests. The Harvard Step Test can help identify or diagnose heart disease. This assessment gauges an individual's ability to sustain physical activity over a period. The faster a person's heart rate returns to baseline after the test, the greater their fitness level [4]. The purpose of the Harvard Step Test is to evaluate work capacity, which reflects a student's physical capability to carry out a task, along with blood pressure assessment, which examines the link between fitness and blood pressure [4].

During World War II, the Harvard Step Test was first developed, Utilized by the armed forces for the purpose of choosing new personnel. It seems that your message was cut off. Please provide the complete text that you would like me to rephrase, and I will be happy to assist you. The Harvard Step Test has gained significant attention. Consideration for application in athletic selection due to the emergence of training in exercise physiology. American Association for Health, Fitness, and Physical Education, Leisure Activities and Dance. As a beneficial initial task to explore cardiovascular well-being. The original bench that was utilized The Harvard Step Test is superior to the modified version and the time permitted for physical activities in minutes to 30 minutes, or until tiredness starts . Changes to the timeframe are restricted to a maximum of 5. The Harvard Step Test is a physical assessment designed to evaluate cardiovascular fitness. [5].

The capability to endure different forms of stress. Requires a basis in three essential areas: Muscle strength, heart health, and overall physical ability. Practical fitness is defined by possessing a complete and effective musculoskeletal system to carry out the related task [6]. Psychological readiness for position will require maintaining emotional stability and inspired, possessing strong ambition, intellect, and additionally being flexible [7]. A person who is being physically fit contributes to a more stable physiological state. Condition while performing moderate tasks and they are able to manage the increased workload and return to a new physical condition arises during moderate activity [8].

AIM:

The current study was designed to establish a correlation between physiological and biochemical changes by physical fitness Index for individuals aged 20 to 30 years, utilizing a Harvard Step Test.

Material and Methods:-

This research was carriedout inthePhysiology Departme ntatthe MedicalCollege. All participants providedwritte n consent after being informed about the study's purpose. Individuals who expressed their desire to take part were included in the study.
The study included a total of 170 individuals of both sexes who were selected from the outpatient department(OPD).Index Medical

College, located in Indore (M. P), India ,was separated into two distinct groups.

FOR STUDY GROUP: INCLUSION CRITERIA

• Obese adult of age (18-35yrs), BMI should be >30kg/m2

EXCLUSION CRITERIA

• A History of diabetes mellitus, hypertension, cardiovascular disease, peripheral vascular disease , diseases with acute and chronic infections, hepatic diseases was also excluded .

CONTROL (NON OBESE) GROUP : INCLUSION CRITERIA

• Obese adult of age (18-35yrs) ,BMI should be 18.5-25 kg/m2

EXCLUSION CRITERIA

• A History of diabetes mellitus, hypertension, cardiovascular disease, vascular disease, autoimmune diseases, alcoholic ,acute and chronic infections, hepatic diseases was also excluded .

Examination of the Physical Fitness Index (PFI):

The PFI tier at which the research participants were situated, the measurement was obtained by utilizing a Revised Harvard Step Test. The exercise test requires the following equipment: Revised Harvard Step: This platform is specifically created for the Harvard step exercise Operational guidelines. A Stopwatch: A stopwatch that may be utilized to tally the number of the time required for them to complete the entire distance. Sphygmomanometer: An instrument that measures blood pressure in a consistent manner. A sphygmomanometer was utilized to measure the blood pressure. Stethoscope: Utilized with a sphygmomanometer is used to measure blood pressure by Auscultation technique. An adjustable metronome .The range (from 40 BPM to 200 BPM) was utilized to modify the repetition of actions. Participants arrived at the department 30 minutes prior to the protocol for exercising commenced. An exercise protocol was provided to each participant, and a Presentation of the exercise procedure to be Provided instructions were also included. Individuals refrained from consuming food or Consume fluids for a minimum of one hour prior to engaging in exercise. Anthropometric measurements were documented for every participant in a pre-arranged format.

After receiving the participants' written consent form, the Biochemical test were measured using the Mindray BS-240 Pro. A baseline blood sample of 2 ml was collected. Venous blood will be obtained by using a disposable syringe in a clean manner and placed in a plain vial, EDTA vial. A volume of 2 ml of blood (serum) will be utilized for the measurement of uric acid, and lipids profile level in simple vials.[9]

RESULTS

Table1: Distribution of gender of young adult in obese and non obese group

Gender	OBESE (n=85)	NON OBESE (n=85)
MALE	67.1%	60.0%
FEMALE	32.9%	40.0%
AGE	25.64 ± 3.054	25.80 ± 2.794

The majority of 67.1% adult were male and 32.9% adult were female in obese group and the majority of 60% adult were male and 40% adult were female in non obese group.

Table 2: To investigate the Physiological changes in young adult obese and compare with the non obese subject.

S.NO	Physiological variables	Obese (mean ± SD)	Non obese (mean ± SD)	P-value
1	HEART RATE	88.58 ± 8.196	75.94 ± 9.002	0.001
2	SYSTOLIC BP	135.74 ± 3.777	126 ± 5.874	0.001
3	DYSTOLIC BP	99.80 ± 6.933	89.98 ± 8.344	0.001
4	PULSE PRESSURE	35.94 ± 7.006	36.02 ± 10.533	0.952
5	HST	35.183 ± 2.833	41.546 ± 5.022	0.001

Table 2 shows that comparison between obese and non obese group in physiological variables in young adult. There was statistical significant difference between obese and non obese group in physiological variables like HEART RATE with P=0.001, SYSTOLIC BP with P=0.001, DYSTOLIC BP with P=0.001, HST with P=0.001. And there was no significant difference in PULSE PRESSURE with P>0.05. Here obese group had higher mean value than non obese group in this study.

Table 3: To estimate URIC ACID, TG and CHOLESTROL in obese adult and controls subjects.

S.NO	Biochemistry variables	Obese (mean ± SD)	Non obese (mean ± SD)	P-value
1	URIC ACID	7.497 ± 1.754	5.667 ± 1.263	0.001
2	TG	203.055± 69.275	146.378± 29.327	0.001
3	CHOLESTROL	234.372± 50.686	183.368± 30.576	0.001

Table 3. Shows that comparison between obese and non obese group in biochemistry variables in young adult. There was statistical significant difference between obese and non obese group in biochemistry variables like Uric acid with P=0.001, TG with P=0.001, Cholesterol with P=0.001. Here obese group had higher mean value than non obese group in this study.

DISCUSSION

The aim of this research was to evaluate the level of physical fitness among young medical students. Regarding the HST (Harvard Step Test). As a means to assess physical fitness. This specific method has demonstrated its effectiveness many times. Instances it was employed in earlier research concentrating on Indian populations [10].

A total of 170 medical students included in the study, it was found that obese subjects have negative physiological and biochemical changes ours in the body. Therefore, the findings support the importance of awareness of physical fitness in medical professionals.

A reverse relationship between BMI and physical fitness was clear for both sexes. This research concurs with results from Ganeriwal et al. [11] who indicated an unfavorable relationship between fitness assessment and physique. Weight/pulse rate and a favorable connection between the evaluation of fitness and body height. Together with Jorge M and others [12] who reached a conclusion regarding a connection between a higher BMI and a lower Cardiorespiratory fitness in females.

In this research, factors of physical fitness had a notable relationship with BMI and exercise level and cardiovascular factors. Physical fitness was found to have a negative relationship with BMI and it is important. We discovered that being physically fit and BMI were inversely related to a statistically meaningful value. This endorses discovery made by Rodrigues and colleagues. [13], where tangible well-being was negatively impacted among those who had elevated heart rates are frequently associated with an increased Body Mass Index (BMI). Individuals who engaged in regular exercise obtained scores elevated on fitness assessments and exhibited a favorable relationship among these indicators. Their results is in accordance with Smith et al. [14] that stated that school children who do not attend residential schools Insufficient physical activity was frequently associated with unfavorable outcomes.

Physical fitness results in comparison to those who are more active. The results from this study indicate a negative relationship between physical fitness and the heart rate at rest. This is in according with Elbel et al. Keen et al. And Cullumbine and others [15], all of whom indicated a equivalent conclusion. In addition to that, as per Albert W and colleagues. [16] and Joshi and colleagues.

Obesity and high levels of uric acid in the blood, along with their associated health problems, have emerged as significant public health issues due to their increasing frequency. The presence of obesity alongside elevated serum uric acid (sUA) levels can speed up the advancement of diseases, leading to increased medical costs and economic strain. This situation poses further challenges to the prevention and management of chronic illnesses. While variations in obesity have been noted to be independently associated with alterations in sUA levels, earlier studies on pathophysiology and metabolism have indicated that these factors may influence one another. Our current findings indicate that increased sUA levels were positively associated with higher BMI in both men and women. This aligns with previous epidemiological and clinical studies showing a strong positive relationship between sUA and obesity in adult populations from China, Japan, India, Pakistan, Iraq, and Bangladesh. [17] The lipid profile parameters, such as total cholesterol showed a statistically significant difference between the normal BMI group and increased BMI group. The rise in these parameters is associated with increase in the risk of developing atherosclerosis, type II diabetes mellitus, etc.

CONCLUSION

Physical fitness related to obesity are a subject of investigation for numerous researchers.. However, by the conclusion of this study, it has been verified that the BMI rises in adults leads to increased changes in cardiovascular health. It has been indicated that engaging in regular exercise is beneficial for managing body mass index (BMI) and has been confirmed to positively influence cardiovascular changes .

The step test has been validated by demonstrating a significant connection with cardiovascular changes. The modifications in the cardiovascular function is validated through the rising levels of biochemical indicators such as uric acid. This research has also confirmed that cholesterol and triglycerides (Tg) contribute to the progression of cardiovascular changes.

These findings emphasize the significance of physical activity among medical students to enhance their physical capability. Organizations may explore methods to encourage student participation in athletic activities and games. Incorporating physical activities into the curriculum. Advocating for the advantages of physical activity on both the body and cognitive levels.

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