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Correlation Between Body Fat Percentage and Simple Reaction Time in Young Individuals

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ABSTRACT:

Fitness is a growing priority today, enhancing well-being and self-esteem. Obesity, a major health concern, is linked to cognitive and coordination issues. Body fat percentage is a more accurate measure than BMI. Reaction time reflects cognitive health and agility, helping in quick decision-making and accident prevention. This study aims to assess the correlation between body fat percentage and reaction time in young adults.

Methods: 110 participants of age 18-25 years both males and females were in involved in the study. Participants who had any neurological disease, visual defects, fracture of upper or lower limb were excluded. Body fat percentage using bioelectric impedence (Omron HBF-375 karada scan) was measured. Simple reaction time was calculated using Deary Liewald software.

Result: Body fat percentage showed a moderate to strong positive correlation with simple reaction time (r=0.1898, P=0.0471).

Conclusion and Clinical implications: A definite increase or delay in reaction time associated with increase in body fat percentage was observed in this study. The study suggests the importance of early intervention in weight management to prevent cognitive and physical performance decline.

Keywords: Body Fat Percentage, Simple Reaction Time, Bioelectric Impedance, Dewy Liewald Software.

INTRODUCTION:

The fitness is now becoming the highest priority on the agenda of modern era, as because it is the fact that, it improves sense of several well-being and enhanced self image. The increasing prevalence of obesity is a significant public health concern especially as the review of literature demonstrates a significant relationship between obesity and cognitive impairment[1].

The obese group have greater difficulty in synchronizing their movement with a visual stimulus[1].Considering that visual motor coordination is an essential component of many ADLs any impairment could significantly affect QOL.

Body composition assessment provides more sensitive and specific measure of risks than BMI (as it includes bone weight and muscle weight and fat)

Bioimpedence analysis is broadly applied approach used in body composition measurements, it uses electrical properties of body to estimate total body water and from that the body fat mass. Reaction time is the time interval between application of stimulus and appearance of voluntary response by subject and which challenges relatively simple cognitive operations. It has been shown that the reaction time is associated with health and general cognitive ability.

AIM OF THE STUDY:
To find correlation between body fat percentage and simple reaction time in young individuals

OBJECTIVES OF THE STUDY:
a) To assess the body fat percentage using bioelectrical impedence
b) To assess the simple reaction time using the Deary Liewald software
c) To find correlation between body fat percentage and simple reaction time.

RESEARCH METHODOLOGY:
Study design: Correlational study
Study population: healthy young individuals
Study place: urban college setting
Sample size: 100 (winpepi software 11.64 version) Sampling method: convenient sampling
Study duration: 0-6months
MATERIALS: Pen, paper, bioelectric impedence (omron HBF-375) , deary liewald software, laptop etc.

INCLUSION CRITERIA:
Age 18-25years, willing to participate.

EXCLUSION CRITERIA:
Upper limb and lower limb fracture or recent surgeries, any neurological condition, any cardiovascular/GI/musculoskeletal disease, visual defects, hormonal imbalance, involved in sports, gym etc[2].

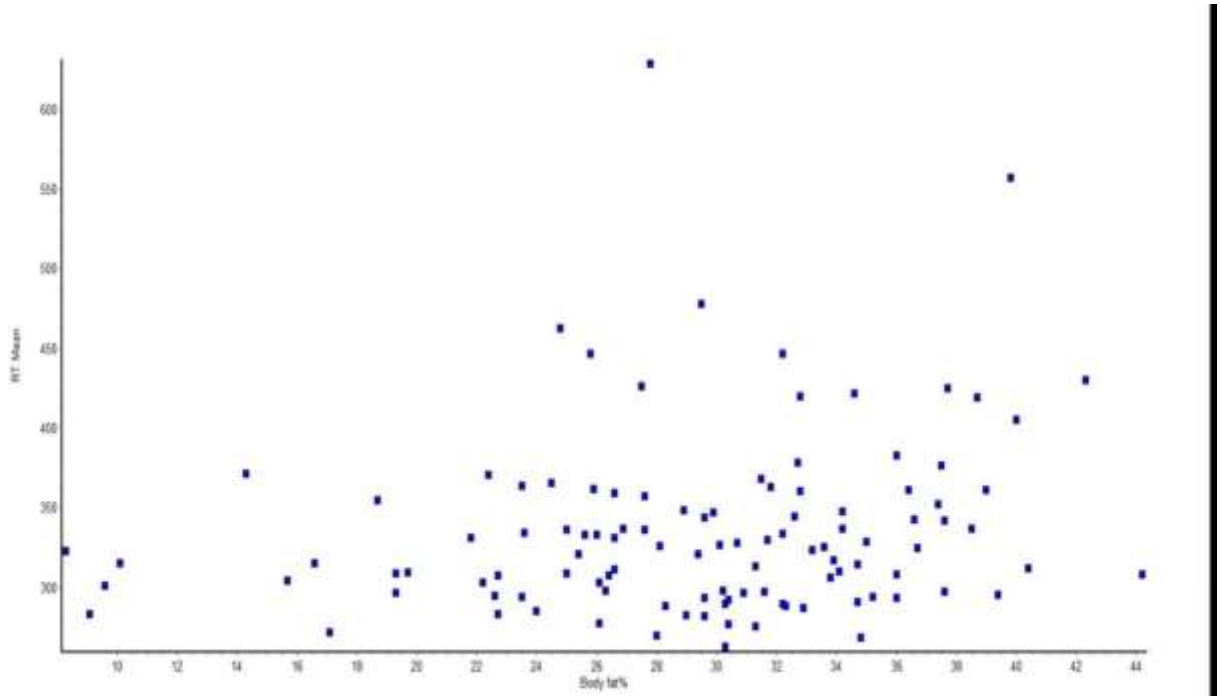
PROCEDURE:
- Ethical committee clearance was taken.
- Subjects were screened according to inclusion and exclusion criteria.
- Subjects were given information sheet and consent forms.
- Karada scan and simple reaction time analysis was taken including total body fat percentage.
- Reaction time was measurer in milliseconds.
- Correlation between body fat percentage and reaction time was done.
- Statistical analysis was done.
- Outcome measure: body fat percentage was measured in percentage and simple reaction time was measured in milliseconds

RESULT:
Body fat percentage showed moderate positive correlation with simple reaction time in young individuals.

Correlation between body fat percentage and simple reaction time was done using Pearson's correlational study.

	Body fat percentage	Simple reaction time
Mean	29. 2345454545	335.7318181818
SD	7.153	57.131
Correlation coefficient (r)	0.1898	
P value	0.0471	
Significant	Statistically significant	

This table presents the statistical relationship between body fat percentage and simple reaction time. The mean body fat percentage is 29.23% with a standard deviation of 7.15, while the mean simple reaction time is 335.73 ms with a standard deviation of 57.13. The correlation coefficient (r) is 0.1898, indicating a weak positive correlation between body fat percentage and reaction time. The p-value is 0.0471, suggesting the correlation is statistically significant ($p < 0.05$).



Inference: Body fat percentage showed a moderate to strong positive correlation with simple reaction time.

CONCLUSION:

A definite increase or delay in reaction time associated with increase in body fat percentage was observed in this study. The study suggests the importance of early intervention in weight management to prevent cognitive and physical performance decline.

LIMITATIONS:

The age included was between 18-25 years.

FURTHER STUDIES:

Various parameters apart from simple reaction time can be studied

DISCUSSION:

In this study the Body fat percentage showed a moderate to strong positive correlation with simple reaction time, reasons for which can be stated below:

Reena Kumari Jha et.al[2] reported that individuals who were both underweight and overweight had a longer reaction time than those who were normal weight. Excess weight and obesity have been linked to various medical issues, including cardiovascular, pulmonary, and endocrine disorders, and they also affect cognitive abilities, attention, and memory. The cerebral region responsible for cognition, memory, vocabulary, processing speed, and reasoning is affected by BMI. Although the precise mechanism by which obesity impacts cognitive function and processing speed remains unclear, there is a hypothesis proposing that the secretions from adipose tissue, including hormones, cytokines, and growth factors, have an effect on brain health.

They also indicated that another potential mechanism might involve varying levels of sex hormones during different phases of the menstrual cycle.

Estrogen elevates the plasma renin level, which facilitates the conversion of angiotensinogen into Angiotensin I. Angiotensin I is subsequently transformed into Angiotensin II by the Angiotensin converting enzyme (ACE), leading to an increased secretion of aldosterone. Aldosterone is responsible for the retention of sodium and water. The retention of these substances may influence axonal conduction time and modify the availability of neurotransmitters at the synaptic level; alterations in either of these processes could impact sensorimotor coordination and the processing speed of the central nervous system.

Samad Esmaeilzadeh et. Al[3] has also noted that while there are reports indicating a negative correlation between obesity and cognitive function, this association may not hold true for every task and measure of obesity. Furthermore, a reverse relationship could be observed between adiposity and certain simple tasks in individuals who are healthy.

Kamijo et al[5] in a study investigating the relationship between an inhibitory control task and adiposity, it was noted that children with higher BMI and fat mass exhibited poorer performance on the incongruent reaction time (RT). However, no correlation was found between congruent RT and adiposity.

According to our knowledge, there are a few studies which explore the association between cognitive function and both central and overall obesity indices among young people and most studies have used overall obesity indices such as BMI and fat percentage . Researchers have proposed several biological mechanisms, including impaired insulin regulation, systemic inflammation, and elevated triglycerides, that may explain how obesity can negatively affect cognitive function. However, these mechanisms have primarily been studied in elderly individuals or animals, highlighting the necessity for additional research focused on younger populations.

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