"AN ASSOCIATION BETWEEN FUNCTIONAL FITNESS, DETERMINANTS OF GAIT AND ABDOMINAL OBESITY IN HEALTHY MIDDLE-AGED FEMALES"

A Dissertation

Submitted

In Partial Fulfillment of the Requirements

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MASTER OF PHYSIOTHERAPY

In

MUSCULOSKELETAL

Submitted by

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INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES AND RESEARCH

INTEGRAL UNIVERSITY, LUCKNOW, INDIA

May, 2022

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DR. ABDUR RAHEEM

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I hereby declare that the thesis titled "**AN ASSOCIATION BETWEEN FUNCTIONAL FITNESS, DETERMINANTS OF GAIT AND ABDOMINAL OBESITY IN HEALTHY MIDDLE-AGED FEMALES**" is an authentic record of the research work carried out by me under the supervision of Dr.Taufish Ahmad Department of Physiotherapy, for the period from2020 to 2022 at Integral University, Lucknow. No part of this thesis has been presented elsewhere for any other degree or diploma earlier.

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Date:

Place: Lucknow

Riza Ahsan

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Abbreviations	Full form
BMI	body mass index
WHR	waist hip ratio
WC	waist circumference

ABSTRACT

Background and Purpose: the aim is to study the association between functional fitness, determinants of gait and cadence in healthy middle-aged females.

Study design:

Subjects: 70 females were taken in this study, there were selected on the basis of inclusion criteria. they should have abdominal obesity and hip –waist circumference was measured.

Result: The relationship between different functional fitness performance, cadence, determinants of gait and abdominal obesity among middle age femals.the present study aimed to investigate the association between functional fitness test performance, determinants of gait and abdominal obesity in middle aged females. A total of 70 data from different area of Lucknow, Uttar Pradesh were collected, reviewed and analysed null hypothesis was accepted because there is no significant difference between abdominal obesity and determinants of gait, functional fitness, cadence.

Conclusion: In conclusion, according to the results of this study, body balance and flexibility are not associated with abdominal obesity the most among the women elderly population. Other muscular strength performances had no limited effects on abdominal obesity. Development of muscle strength in the elderly people should be emphasized and encouraged to maintain their functional abilities.

Keywords: functional capability, independent ability, abdominal obesity

CHAPTER-1

INTRODUCTION

Obesity has reached epidemic proportions globally, with at least 2.8 million people dying each year as a result of being overweight or obese.

Obesity can be defined as excess body fat, and in epidemiological studies, the body mass index (BMI) is the standard measure used to characterize normal and overweight.[1]Obesity may lead to relevant comorbidities and severity which are proportional to excess body fat.[2] Studies indicate that there is a difference in the accumulation of body fat between the sexes; women have a significantly higher amount of total body fat than men of the same BMI.[3] Between 1980 and 2008, the average BMI in the world increased about 0.4 kg/m^2 per decade for men and 0.5 kg/m^2 per decade for women.[4]

BMI is a person's weight in kilograms divided by the square of height in meters. A high BMI can indicate high body fatness.

- If BMI is less than 18.5, it falls within the underweight range.
- If BMI is 18.5 to <25, it falls within the healthy weight range.
- If BMI is 25.0 to <30, it falls within the overweight range.
- If BMI is 30.0 or higher, it falls within the obesity range.

Obesity is frequently subdivided into categories:

- Class 1: BMI of 30 to < 35
- Class 2: BMI of 35 to < 40
- Class 3: BMI of 40 or higher. Class 3 obesity is sometimes categorized as "severe" obesity.

Norma l (healthy weight)	From 18.5 to 25
Overweight from 25 to 30	From 25 to 30
Obese class I (moderately obese)	From 30 to 35
Obese class II (severely obese)	From 35 to 40
Obese class III (very severely obese)	Over 40

Table 1.1: WHO values for diagnosis of obesity according to BMI.

BMI does not measure body fat directly, but BMI is moderately correlated with more direct measures of body fat obtained from skinfold thickness measurements, bioelectrical impedance, underwater weighing, dual energy x-ray absorptiometry (DXA) and other methods [5.6.7]. Furthermore, BMI appears to be strongly correlated with various adverse health outcomes consistent with these more direct measures of body fatness [8,9,10,11,12]

The Waist-to-hip Ratio (WHR) looks at the proportion of fat stored on your body around your waist and hip. It is a simple but useful measure of fat distribution. The Waist Hip Ratio is calculated by dividing your waist measurement by your hip measurement, since the hips are the widest part of your buttocks. The formula is: *WHR= waist circumference / hip circumference.* Having an apple shape (carrying extra weight around the stomach) is riskier for your health than having a pear shape (carrying extra weight around your hips or thighs). This is because body shape and health risks are linked. If you have more weight around your waist you have a greater risk of lifestyle related diseases such as heart disease and diabetes than those with weight around their hips. Ideally, women should have a waist-to-hip ratio of 0.8 or less, whereas men should have a waist-to-hip ratio of 0.95 or less.

Functional fitness refers to Functional training has its origins in rehabilitation. Physical and occupational therapists and chiropractors often use this approach to retrain patients with movement disorders. Interventions are designed to incorporate task and context specific practice in areas meaningful to each patient, with an overall goal of functional independence.[13] For example, exercises that mimic what patients did at home or work may be included in treatment in order to help them return to their lives or jobs after an injury or surgery. Thus, if a patient's job required repeatedly heavy lifting, rehabilitation would be targeted towards heavy lifting, if the patient were a parent of young children, it would be targeted towards moderate lifting and endurance, and if the patient were a marathon runner, training would be targeted towards re-building endurance. However, treatments are designed after careful consideration of the patient's condition, what he or she would like to achieve, and ensuring goals of treatment are realistic and achievable.

Functional training attempts to adapt or develop exercises which allow individuals to perform the activities of daily life more easily and without injuries.[14]

Cadence is an essential ambulatory movement pattern and together with stride length delineate speed of ambulation. In this well-known relationship, cadence is the most overtly accessible (and therefore measurable) factor, and especially more so now given the growing availability of wearable technologies capable of tracking this metric in real-time [15]

Aims and objectives:

- To find out the abdominal obesity in middle age females.
- To estimate the association of abdominal obesity in middle aged females.
- To find out the correlation of abdominal obesity in middle aged females its functional fitness and determinants of gait.

Hypothesis:

Experimental Hypothesis:

- There will be effect of abdominal obesity will alter determinant of gait and functional fitness.

Null hypothesis:

- There will be no effect of abdominal obesity on determinant of gait and functional fitness.

Operational definitions

Obesity

Obesity is an abnormal accumulation of fat, usually 20% or more over an individual's ideal body weight. Obesity is associated with increased risk of illness, disability. Excessive weight can result in many serious, potentially life-threating health problems, including hypertension, Type II diabetes mellitus, increased risk for coronary disease, increased unexplained heart attack, infertility, hyperlipidemia etc.[16]

Abdominal obesity

Abdominal obesity, also known as central obesity and truncal obesity, is a condition when excessive abdominal fat around the stomach and abdomen has built up to the extent that it is likely to have a negative impact on health. Abdominal obesity has been strongly linked to cardiovascular disease,[17] Alzheimer's disease, and other metabolic and vascular diseases.[18]

Visceral and central abdominal fat and waist circumference show a strong association with type 2 diabetes.[19]

Visceral fat, also known as organ fat or *intra-abdominal fat*, is located inside the peritoneal cavity, packed in between internal organs and torso, as opposed to subcutaneous fat, which is found underneath the skin, and intramuscular fat, which is found interspersed in skeletal muscle. Visceral fat is composed of several adipose depots including mesenteric, epididymal white adipose tissue (EWAT), and perirenal fat. An excess of adipose visceral fat is known as central obesity

Body mass index

The body mass index (BMI) is a statistical measurement derived from your height and weight. Although it is considered to be a useful way to estimate healthy body weight, it does not measure the percentage of body fat. The BMI measurement can sometimes be misleading - a muscleman may have a high BMI but have much less fat than an unfit person whose BMI is lower. However, in general, the BMI measurement can be a useful indicator for the 'average person'[20.] Obesity is a condition where a person has accumulated so much body fat that it might have a negative effect on their health. If a person's bodyweight is at least 20% higher than it should be, he or she is considered obese. If your Body Mass Index (BMI) is between 25 and 29.9 you are considered overweight. If your BMI is 30 or over you are considered obese.

BMI = weight (kg) / {Height (m)}^{2}

Cadence

Cadence or walking rate is calculated in steps per minutes.[21]

Step length

step length is the distance between the point of initial contact of one foot and the point of initial contact of the opposite foot. In normal gait left and right step length are similar .[22]

stride length

stride length is the distance between successive point of initial contact of same foot. Right and left stride length are normally equal.[23]

functional fitness

Functional fitness means doing movements that mimic everyday actions, incorporating multiple muscles groups at the same time. This builds strength, stability and mobility across the body, making us more efficient human beings not only inside the gym but outside as well.[24]

Back scratch test

The back-scratch test, or simply the scratch, measures how close the hands can be brought together behind the back. This test is part of the Senior Fitness Test Protocol, and is designed to test the functional fitness of seniors. Another shoulder flexibility test designed for testing the elderly is the Shoulder Circumduction Test. This test measures general shoulder range of motion.[25]

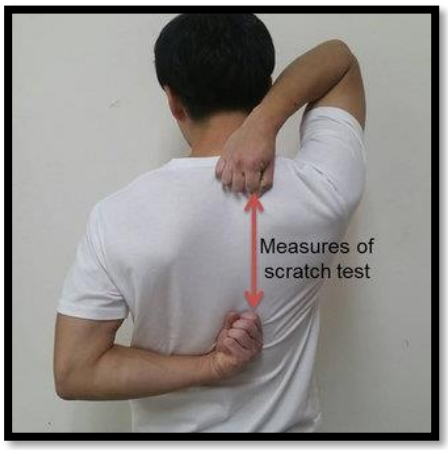


Figure 1.1: back scratch test

Chair sit and reach test:

The chair sit and reach test are a variation of the traditional sit and reach flexibility test. It is part of the Senior Fitness Test Protocol, and is designed to test the functional fitness of seniors. This test measures lower body flexibility.[26]

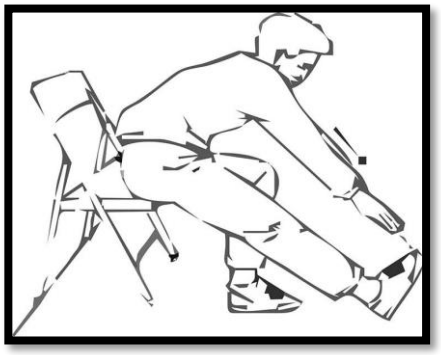


Figure1.2: chair sit and reach test

CHAPTER-2

REVIEW OF LITERATURE

Abdominal obesity also known as central or visceral obesity refers to the abdominal fat mass. This has been shown to vary within a narrow range of total body fat and body mass index (BMI). In 1997, abdominal obesity was recognized by the World Health Organization (WHO) Expert Consultation on Obesity Committee, as a proxy measure to be used to refine BMI levels, especially in populations with predisposition to central obesity.

Abdominal obesity, and specifically visceral adipose tissue, is associated with increased risk of disease-specific morbidity and mortality, with the primary abdominal obesity-mortality cause being CVD.Studies have found that measures of abdominal obesity are better predictors of cardiovascular disease (CVD) risk, although using multiple measures, including BMI may increase sensitivity.

More specifically, abdominal obesity is associated with a range of metabolic disorders, including adverse lipid profile, impaired glucose tolerance and insulin sensitivity, high blood pressure (BP), and others, that have been shown to originate early in childhood.[27]

Abdominal obesity has been closely related to a variety of metabolic disorders such as type 2 diabetes, cardiovascular diseases, cancers, and total mortality. The most widely used measures for abdominal obesity include waist circumference (WC) and waist-to-hip ratio (WHR), which are determined by both environmental and genetic factors. Classic genetic studies such as twin studies and family studies have indicated that a high proportion of variance in WC or WHR is determined by genetic components.[28]

Abdominal obesity can develop to morbid obesity within a short period of time. Severe abdominal obesity is accompanied by hyperinsulinemia that commonly leads to insulin resistance, metabolic syndrome, inflammation, and eventually to diabetes mellitus and coronary heart disease. A better understanding of the factors and metabolites responsible for the development of metabolic diseases and ways to prevent life-threatening outcomes are needed.[29]

the significance of abdominal obesity and its contribution to metabolic syndrome, it is necessary to appreciate the link between the diseases associated with this condition. The accumulation of ectopic fat in tissue surrounding the viscera is directly related to the development of insulin resistance [30]. Insulin resistance is thought to be the common denominator in the development of metabolic syndrome. In addition, evidence suggests that systemic inflammation is an important factor in its development, through the development of insulin resistance [31,35]. Visceral fat deposits (abdominal adiposity) are associated with the development of adipose cells that are enlarged and dysfunctional (adenopathy, or 'sick fat') [32]. Dysfunctional adipose tissue secretes pro-inflammatory biomarkers including prostaglandins, C-reactive protein (CRP), and cytokines such as interleukins (e.g., interleukin-6), tumor necrosis factor alpha (TNF-α), and leptin [32,33]. With increasing obesity there is also a corresponding decrease in levels of adiponectin, an antiatherosclerosis adipokine [34]. Inflammatory mediators released by adipose tissue contribute to the development of type II diabetes, hyperlipidemia and cardiovascular disease [35,36]. If there is a high proportion of fat to muscle this is likely to contribute to this metabolic dysfunction as an increase in circulation of free fatty acids requires greater insulin secretion for control of glucose metabolism. The resulting hyperinsulinemia desensitizes insulin-sensitive tissues, which predisposes individuals to type II diabetes [37]. The decrease in adiponectin secretion also inhibits insulin receptor proteins. Moreover, regular consumption of foods rich in carbohydrate results in postprandial hyperglycemia which causes repetitive acute inflammation which might contribute to a chronic inflammatory state [38]. Chronic systemic inflammation increases oxidative stress and reduces metabolic flexibility, thus perpetuating metabolic syndrome, leading to a vicious cycle of disease, depression and further inactivity [39,40].

at. J. Environ. Res. Public Health et al **2021 – "The Associations between Functional Fitness Test Performance and Abdominal Obesity in Healthy Elderly People: Results from the National Physical Fitness Examination Survey in Taiwan"** concluded that, according to the results of this study, body balance and flexibility are associated with abdominal obesity the most among the Taiwanese elderly population. Other muscular strength performances had limited effects on abdominal obesity. Development of muscle strength in the elderly people should be emphasized and encouraged to maintain their functional abilities.[41]

. **Catrine Tudor-Locke , Elroy J. Aguiar1, Ho Han1, Scott W. Ducharme1, John M. Schunk Jr, Tiago V. Barreira, Christopher C. Moore1, Michael A. Busa, Jongil Lim, John R. Sirard, Stuart R. Chipkin and John Staudenmayer et al 2019- "**Walking cadence (steps/min) and intensity in 21–40year olds: CADENCE-adults" they concluded that , 100 steps/min and 130 steps/min are acceptable heuristic cadence thresholds associated with absolutely-defined moderate and vigorous intensity walking, respectively, in 21–40year olds. Each 10 steps/ min increase is roughly associated with an increase in intensity of 1 MET such that 4 METs is associated with 110 steps/min and 5 METs with 120 steps/min. Future reports from the CADENCE-Adults study will either confirm these values or establish age-appropriate heuristic thresholds for walking across the adult lifespan of 21–85years of age. Additional research is needed to gauge the utility and limitations of individualized cadence-based prescriptions potentially linked to indicators of relative intensity .[42]

Lance E Davidson, Robert Hudson, Katherine Kilpatrick, Jennifer L Kuk, Kathleen Millan, Peter M Janiszewski et, al. (2009) "Effects of exercise modality on insulin resistance and functional limitation in older adults: a randomized controlled trial" they concluded the combination of resistance and aerobic exercise was the optimal exercise strategy for simultaneous reduction in insulin resistance and functional limitation in previously sedentary, abdominally obese older adults.[43]

SoJung Lee,Jennife L. Kuk,Lance E. Davidson et al (2005) "Exercise without weight loss is an effective strategy for obesity reduction in obese individuals with and without Type 2 diabetes" In conclusion, the results of this study suggest that moderate-intensity exercise without weight loss or calorie restriction is associated with significant reductions in total fat, visceral fat, and skeletal muscle lipid content in both obesity and T2D. Combined with the observation that abdominal obesity conveys a significant health risk and that increased cardiorespiratory fitness is associated with a reduction in morbidity and mortality independent of BMI (20, 40), our findings have important public health implications. Indeed, they augment current guidelines and provide compelling evidence that engaging in regular physical activity (~60 min of walking or light jogging on all or most days of the week) is another effective means of reducing obesity and related co-morbid conditions.[44]

Katherine M Flegal, Margaret D Carroll et al (2012) "Prevalence of obesity and trends in the distribution of body mass index among US adults." They concluded in 2009-2010, the prevalence of obesity was 35.5% among adult men and 35.8% among adult women, with no significant change compared with 2003-2008.[45]

Manal K. Youssef et al (2014) "The impact of obesity on walking and physical performance." They concluded Lifestyle modify cation in the form of a low-caloric diet accompanied by exercise has a positive effect on physical performance and consequently on the quality of life.[46]

Gurevich K. G., Burdukova E. V. Et al. (2012) "Overweight and Obesity Prevalence and Physical Activity among Moscow Schoolchildren" they concluded in comparison with the same monitoring of overweight and obesity prevalence in Moscow schoolchildren population we done 3 years ago [17], number of boys with overweight and obesity seems to be the identical. In the same time, number of girls with overweight and obesity increase.[47]

In any case we have to speak about critical levels of overweight and obesity in population of Moscow schoolchildren. Such high levels of obesity and overweight in schoolchildren population might influence on serious public health problems in future.

We have studied the relation of physical health of schoolchildren with the peculiarities of their development. Shown that the maturation of schoolchildren accompanied by an increase of IPH. At the same time increases the mean value of BMI, which may indicate an increase in the intensity of risk factors for cardiovascular disease.

Hong-bo He, Zhi-gang Zhao, Yun-fei Pu (2008) "Relationship of different types of abdominal obesity to risk of metabolic syndrome" they concluded that the Different types of abdominal obesity have important impacts on the risk of metabolic syndrome. Masked VFO, even though with normal WC, and pseudo-VFO have considerably higher cardiometabolic risks.

Gislaine Criestina Vagetti1 Valdomiro de Oliveira Michael Pereira Silva Ana Beatriz Pacífico Tiago Rocha Alves Costa Wagner de Campos et al 2017 – "Association of body mass index with the functional fitness of elderly women attending a physical activity program" they condluded that the present study indicated an association between BMI and the functional fitness of elderly women enrolled in the Idoso em Movimento program in the city of Curitiba, Paraná, Brazil. The results showed that the majority of the elderly female participants that were evaluated were either overweight or obese. The majority of individuals classified as obese exhibited low fitness in each of the tests that were completed. It was shown that a greater proportion of elderly female participants classified as eutrophic displayed adequate functional fitness when executing the following tests: Walk for 6 minutes, Chair stand, Chair sit and reach, Back scratch, and 8 foot up and go. The analyses of the variable categories of BMI associated with functional fitness revealed that obese elderly female participants were more likely to have low functional fitness for the following tests: Walk for 6 minutes, Chair stand, Chair sit and reach, Back scratch and 8 foot up and go.

- The present study indicates that the BMI categories of the elderly female participants from the program are associated with functional fitness. This emphasizes the importance of controlling the BMI of elderly persons, as it can interfere with the execution of activities that involve functional

- fitness, which are of fundamental importance to the dayto-day life of elderly individuals, ensuring they are capable of carrying out their daily activities through the use of muscular exertion, physical conditioning, flexibility, agility and balance .[49]

Tânia Cristina Dias da Silva-Hamu et al. (2013) "The impact of obesity in the kinematic parameters of gait in young women" The conclusion of this study revealed that obesity is a factor that negatively influences the kinematic parameters of gait of young women.[50]

Carole A. Paley et al. (2018) "Abdominal obesity and metabolic syndrome." They concluded that there is moderate evidence supporting the use of programmes of exercise to reverse metabolic syndrome although at present the optimal dose and type of exercise is unknown. The main challenge for health care professionals is how to motivate individuals to participate and adherence to programmes of exercise used prophylactically and as a treatment for metabolic syndrome.[51]

Roberta de Oliveira Máximo et.al, nov (2019) "Abdominal obesity, dynapenia and dynapenic-abdominal obesity as factors associated with falls" they concluded that theimportant implications for the identification of older adults with a greater chance of falls and can help in the development of rehabilitation strategies. Therefore, abdominal obese, dynapenic, and dynapenic abdominal obese individuals should be target groups for the management of falls and their consequences.[52]

Luís B Sardinha et.al, (2012) "Prevalence of overweight, obesity, and abdominal obesity in a representative sample of Portuguese adults" they concluded This study determined the prevalence of overweight, obesity, and abdominal obesity in the Portuguese adults and examined the relationship between above mentioned prevalences and educational level.[53]

Hua Zhang et. Al, (2017) "Relation of socioeconomic status to overweight and obesity: a large population-based study of Chinese adults." They concluded SES was associated with general and abdominal overweight/obesity and sex may play a role in such an association.[54]

Shunquan Wu et al, (2014) "Abdominal obesity and its association with health-related quality of life in adults: a population-based study in five Chinese cities." They concluded Physical health, but not mental health, was more vulnerable to impairment with abdominal obesity, and the impairments varied between genders. Public health agencies should emphasize that abdominal obesity impairs physical health.[55]

Yong-Woo Park et.al, (2003) "The metabolic syndrome: prevalence and associated risk factor findings in the US population from the Third National Health and Nutrition Examination Survey." They concluded the metabolic syndrome is present in more than 20% of the US adult population; varies substantially by ethnicity even after adjusting for body mass index, age, socioeconomic status, and other predictor variables; and is associated with several potentially modifiable lifestyle factors. Identification and clinical management of this high-risk group is an important aspect of coronary heart disease prevention.[56]

Theodore Dassios, Anna Katelari et al. (2013) "static cycle exercise and respiratory muscle strength in patients with cystic fibrosis" This crosstional study assessed nutrition, pulmonary function and respiratory muscle function in 37 CF patients that undertook regular aerobic exercise and, in a control, group matched for age and gender which consisted of 44 CF patients that did not undertake regular exercise. Respiratory muscle function in CF was assessed by maximal

inspiratory pressure (Pimax), maximal expiratory pressure (Pemax) and pressuretime index of the respiratory muscles (PTImus). Median Pimax and Pemax were significantly higher in the exercise group compared to the control group (92 vs. 63 cmH20 and 94 vs. 64 cmH20 respectively). PTImus was significantly lower in the exercise group compared to the control group (0.089 vs. 0.121). Upper arm muscle area (UAMA) and mid-arm muscle circumference were significantly increased in the exercise group compared to the control group (2608 vs. 2178 mm2 and 23 vs. 21 cm respectively). UAMA was significantly related to Pimax in the exercising group. These results suggest that CF patients that undertake regular aerobic exercise maintain higher indices of respiratory muscle strength and lower PTImus values.[57]

"**A Comparative Study of Yoga and static cycle in Obesity and its Effect on Pulmonary Function**" Nisha Shinde1*, Shinde KJ2, et al. (2013) Prospective comparative cross-sectional study was conducted in Rural Community. Total 60 subject's male and females diagnosed with obesity were divided into 2 group thirty subjects were divided into two groups by block random sampling method that is group I and II. After explaining procedure both groups were revaluated for baseline parameters like B.M.I. and pulmonary functions. (MVV, FEV1/FVC) group I started with aerobic exercise that is walking and Group II started with pranayama & postures of yoga that can help to reduce weight. After applying "t" test pre yoga practice and static cycle also post yoga and aerobics practice data shows highly significance difference between mean and standard deviation values of all parameters in group II (Yoga group) i.e. ($p < 0.01$). this study concludes that regular practice of yoga is really helpful in weight reduction & improves the pulmonary function.[58]

Alone on Coronary Risk Factors in Obese Coronary Patients" Hussein N, Thomas M, Prince Det.al (2015) 50 coronary artery disease patients completed the study and were randomized to group I aerobic exercise (n=25), and group II combined resistive and aerobic exercise (n=25). All patients had dietary counselling, stress management and aerobic exercise 3 times per week for 36

sessions. Group II added resistive exercise from the 18th session. All exercises were telemetry-monitored. Strength gains for group II were greater than for group I on the three resistance machines ($P<0.01$). Percent body fat was reduced for group II after training ($P<0.01$) with significant difference in between groups($P<0.01$). The relative gain in lean mass was greater in group II ($P=0.0006$). Group II only had decreased cholesterol, triglyceride, and low-density lipoprotein ($P<0.05$). High density lipoprotein significantly increased in both groups ($P<0.05$). All cardiovascular conditioning parameters significantly diminished in both groups after training ($P<0.05$). Group II had lower exercise systolic blood pressure ($P<0.05$) and relatively greater improvement in average work load ($P=0.0000$). Combined resistive and aerobic training give better control of coronary risk factors particularly lipid profile and weight in obese coronary patients.[60]

Brain activity responses to visual food stimuli were visualized using functional MRI. Lipton levels fell during weight loss and increased brain activity in areas involved in emotional, cognitive, and sensory control of food intake. Restoration of leptin levels-maintained weight loss and reversed the changes in brain activity. Thus, leptin is a critical factor linking reduced energy stores to eating behaviour. Potentially, leptin therapy could sustain weight loss by overriding the tendency toward energy conservation

Rosenbaum et al. present a thorough description of brain activity under different weight conditions and leptin levels (4). At the initial weight, visual food stimuli induced activity in brain areas involved in energy homeostasis, autonomic and hormonal regulation, as well as emotional and executive control of eating behaviour. The hypothalamus, amygdala, hippocampus, Para hippocampal and cingulate gyri, and frontal and parietal cortex all showed increased activity. In contrast, the weight-reduced state was associated with increased activity in the brainstem, Para hippocampal gyrus, culmen, and Globus pallidus, as well as areas in the frontal and temporal

cortex involved in decision-making functions. As predicted, leptin replacement in the weight reduced state reversed brain activity to the pattern observed at the initial weight. These findings could have been strengthened by the inclusion of subjective ratings of appetite and measurement of other circulating metabolic factors aside from leptin. Furthermore, BOLD signals do not establish whether the regions affected by leptin are targeted directly or indirectly.

CHAPTER-3
MATERIALS AND METHODS

This study was an observational study in which within subject design was used. Ethical approval was obtained from the ethical board of integral university integral institute of allied health science and research, department of physiotherapy. all the patients were informed about the objectives and agreed to voluntarily participate in the study.

Subjects:

Seventy subjects (females) were selected for this study. these subjects were abdominal obeses that were found from Lucknow local area.

inclusion criteria:

inclusion criteria were based on patient able to walk without any support, female patient, patient should meet the criteria of abdominal obese.

Exclusion criteria:

Exclusion criteria includes any kind of medical emergency, any kind of injury or disease within past two weeks, other factor which may affect the efficacy of test, any lower limb injury, diabetes, hypertension.

Variables:

Independent variables

- Cadence
- Speed
- Functional fitness

Dependent variables

- Abdominal obesity

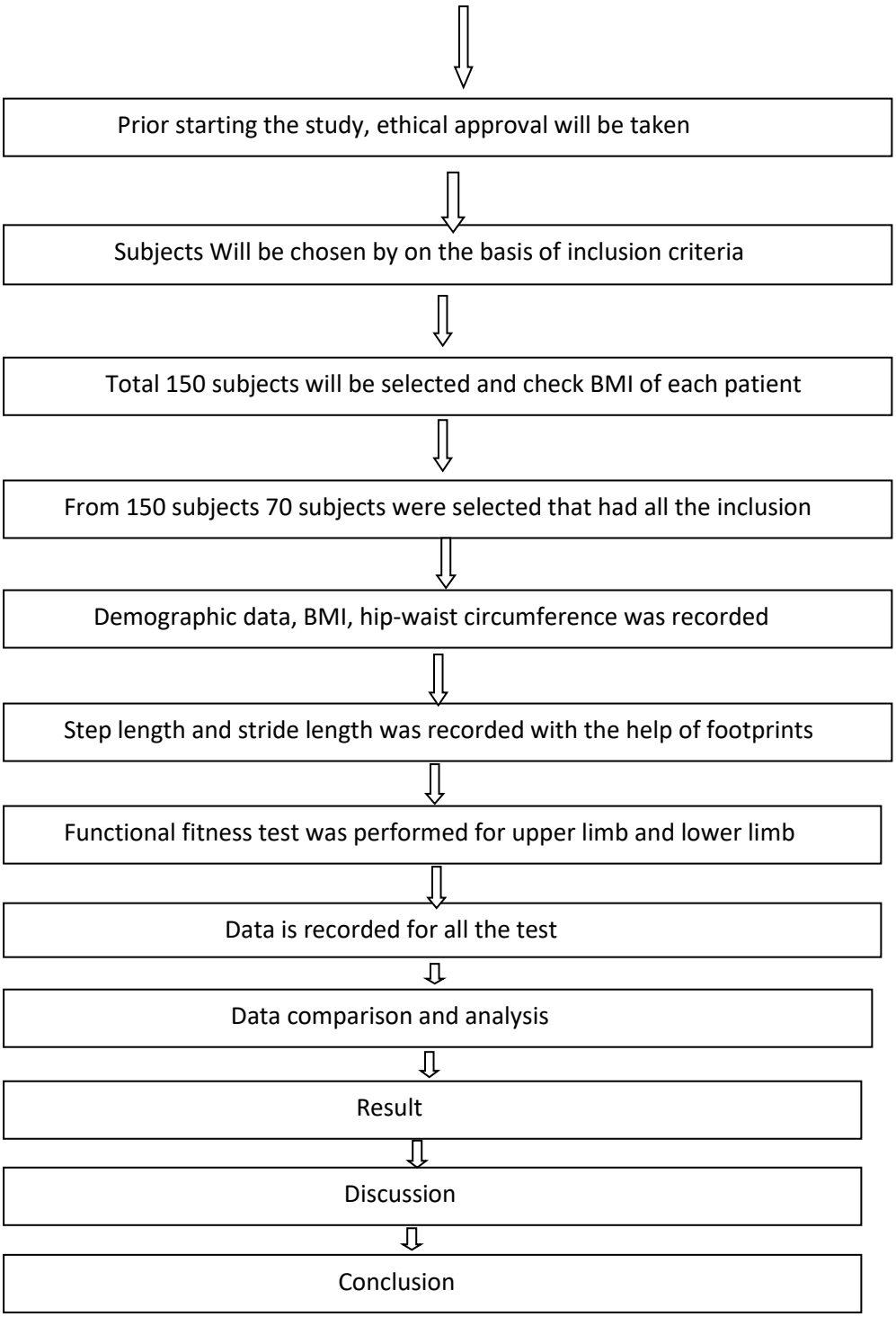
Procedure:

The subjects were taken on the basis of selection criteria that is the subject should be abdominal obese that was measured using the inch tape if the subject was meeting the selection criteria. subjects were explained the procedure of the study as well as protocols of the study. The height, weight, BMI, hip waist circumference was recorded after these subjects were asked to give their foot prints so that we can get step length a stride length. then subjects were asked to walk for 1 min to get cadence and it was recorded. the subjects were asked to perform two tests to check their functional fitness back scratch test and chair sit and reach test was recorded for both upper limb and lower limb simultaneously. Before all these subjects were asked to sign consent, form and everything was explained

Figure: subject measuring height

Figure: subject measuring weight

PROTOCOL


Prior starting the study, ethical approval will be taken
Subjects Will be chosen by on the basis of inclusion criteria
Total 150 subjects will be selected and check BMI of each patient
From 150 subjects 70 subjects were selected that had all the inclusion
Demographic data, BMI, hip-waist circumference was recorded
Step length and stride length was recorded with the help of footprints
Functional fitness test was performed for upper limb and lower limb
Data is recorded for all the test
Data comparison and analysis
Result
Discussion
Conclusion

PROCEDURE

General instructions:

Subjects were instructed to wear comfortable clothing and walking shoes, and do not exercise within 2 hours prior of the test.

Step length and stride length:

The step length is the distance from the heel print of one foot to the heel print of the other foot during a walking stride. This is the distance traveled forward by a single leg. An average that you will see listed in many places is 2.2 feet (0.67 meters) for women and 2.5 feet (0.762 meters) for men, but it depends very much on height.[1]

Stride length can mean the same thing as step length, or it can mean the distance traveled by the heel of one foot to the next time that same foot strikes down. In other words, it is two steps since in that time the other foot has also touched down once

Cadence:

To measure your cadence is to count the times your feet hit the ground in 60 seconds. Cadence can also be defined as the number of steps one foot takes per minute. Usually 180 step/minutes is calculated.

Hip- waist circumference:

- Stand up straight and breathe out. Use a tape measure to check the distance around the smallest part of your waist, just above your belly button. This is your waist circumference.
- Then measure the distance around the largest part of your hips — the widest part of your buttocks. This is your hip circumference.
- Calculate your WHR by dividing your waist circumference by your hip circumference.

Back scratch test:

The back-scratch test is a shoulder flexibility test used to evaluate the flexibility and mobility of your shoulder joint. The test can also be used to assess the range of motion (ROM) of your shoulder, including flexion and extension.

perform the back-scratch test by touching your palm to the opposite shoulder blade by bending your elbow above or below your shoulder. It can be a helpful test and stretch to perform before any upper-body sport workout or strength-training workout that includes throwing, catching, or any shoulder movement.

Chair sit and reach test:

The subject sits on the edge a chair (placed against a wall for safety). One foot must remain flat on the floor. The other leg is extended forward with the knee straight, heel on the floor, and ankle bent at 90°. Place one hand on top of the other with tips of the middle fingers even. Instruct the subject to inhale, and then as they exhale, reach forward toward the toes by bending at the hip. Keep the back straight and head up. Avoid bouncing or quick movements, and never stretch to the point of pain. Keep the knee straight, and hold the reach for 2 seconds. The distance is measured between the tip of the fingertips and the toes. If the fingertips touch the toes then the score is zero. If they do not touch, measure the distance between the fingers and the toes (a negative score), if they overlap, measure by how much (a positive score).

Data collection:

Prior to study, all participants had height, weight, BMI, hip waist circumference was measured. Each subject was given consent to be signed.

At the conclusion of the test step length, stride length, cadence, back scratch test and chair sit and reach test was recorded.

Outcome measures

- Hip –waist circumference
- Cadence
- Step length
- Stride length
- Back scratch test
- Chair sit and reach test

Equipment's

- Pen
- White paper roll
- Ink
- Chair
- Inch tape
- ruler

CHAPTER 4

RESULT

DATA ANALYSIS

All statistical data were analyzed by the professional statesman. The data were analyzed by MS excel 2010 data analysis tool pack, excel analysis tool pack 2019. The dependent variables were summarized by mean, standard deviation, and the independent variables summarized by percentage and age is summaries by mean value.

RESULT

Two spearman correlation was used to study the association between functional fitness, determinants of gait and abdominal obesity in healthy middle-aged females" in this study we found that there is no association between the abdominal obesity and gait determinants, as the null hypothesis was accepted. As the value of spearman correlation is less than 1, it indicates that the there is no correlation in between the abdominal obesity and the gait parameters.

There is no significant difference of cadence on abdominal obesity.

	BMI		*HIP-WAIST CIRCUMFERENCE (cm)*	
	r- value	*p- value*	*r- value*	*p- value*
STEP LENGTH (cm)	0.02645035	>0.05	-0.21968677	0.0697
STRIDE LENGTH (cm)	0.12451381	>0.05	-0.05790454	>0.05
CADANCE (step/min)	-0.1171576	>0.05	0.04459066	>0.05
BACK SCARTCH RT (cm)	-0.121449	>0.05	0.10966246	>0.05
BACK SCARTCH LT (cm)	0.08949389	>0.05	0.1259753	>0.05
CHAIR SIT AND REACH TEST RT (cm)	-0.0858869	>0.05	0.09070188	>0.05
CHAIR SIT AND REACH TEST LT (cm)	-0.0726812	>0.05	0.11996172	>0.05

Table 4.1: showing correlation between r-vale and p-values were statistically non-significant according to the p –value at less than 0.05 and R-value not near the 1 of BMI and hip –waist circumference

Demographic data

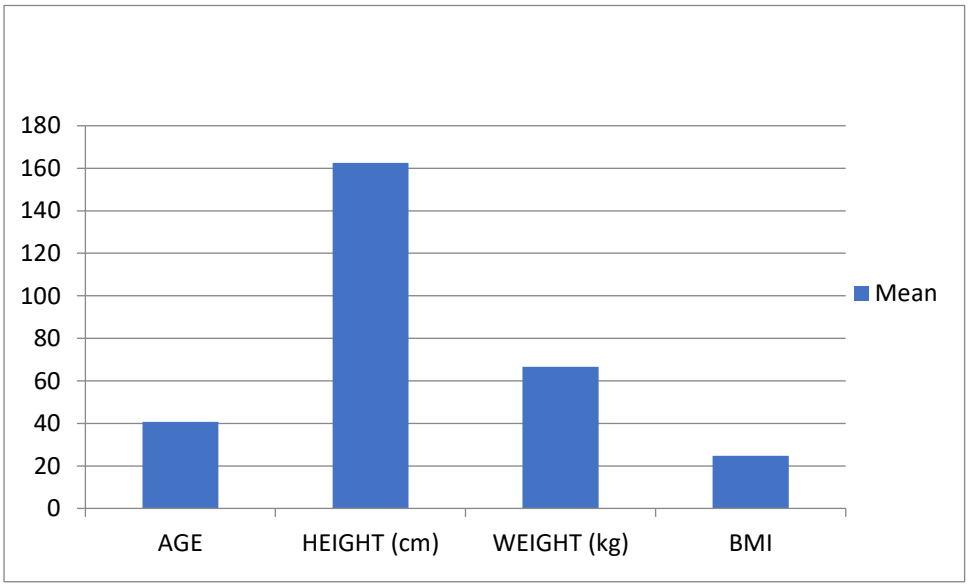
Table 1: comparison of mean and standard deviation of demographic data

Age	Height	Weight	BMI
Mean ± SD	Mean +/- SD	Mean +/- SD	Mean +/- SD
40.74±6.73	162.6±7.81	66.6±11.2	24.8±4.54

Table 4.2: mean and standard deviation representing demographic data

demographic data	age	Height	Weight	BMI
Mean	40.74	162.58	66.61	24.77

Table 4.3: mean of demographic data



Graph 4.1: the bar graph showing the mean of demographic

CHAPTER-5

DISCUSSION

The present study aimed to investigate the associations between functional fitness test performance and abdominal obesity risk among healthy middle age females. Our result contained the data from 70 females and indicated that there is intercomparison between functional fitness test and age of females. first there shows no significance difference in lower limb flexibility test (chair sit and reach test). mean is 2.34 which shows no significance difference in test because females are more flexible to males and can-do activities without any stress. It is understandable that physically untrained populations commonly perform lower-limb and core muscle strength exercises, which are fundamental for body balancing. Some studies have implied that functional fitness exercise training is positively associated with body balance abilities among elderly people.[60] Moreover, studies have indicated that body balance ability is negatively associated with abdominal obesity.[61,62]

There is no significant difference in upper limb flexibility test (back scratch) the upper extremity muscular endurance scores of older adults with poor activity and physical fitness scores revealed obesity as a critical indicator of health-related physical fitness performance.
But the subjects were early middle age and females are flexible so they can perform test.[63]

There is no impact of cadence on abdominal obesity. The major findings are first that there was no difference between the weight groups in average daily step volumes. Second, there were significant differences between weight groups in some step cadence indices which suggest higher step intensities. Third, cadence strategies chosen to accumulate steps differed between weight groups and walking pattern parameters were significantly associated with anthropometric, health and socio-economic variables. There is significant effect of walking on abdominal obesity.[64]

There is no significant effect of determinants of gait on abdominal obesity. There is no effect on step length and stride length on abdominal obesity. Overweight participants had similar gait patterns with normal weight participants for all mechanical energy usages, while elongated gait phases such as ankle 1st plantar flexion duration and stance duration were more similar between overweight and obese participants in maximum-speed walking. [65]

Limitation of the study

the study is limited to small sample size.

The study was done on only females' adults.

The study has limitation of hip to waist circumference as indicator of abdominal obesity.

The upper limb and lower limb flexibility test were limited to back scratch and chair sit and reach test.

Scope for future research

sample size could be more

the study could be done on both males and females' group

other indicators of abdominal obesity could be taken like skin fold measurement to be more accurate.

CHAPTER-6

CONCLUSION

In conclusion, according to the results of this study, body balance and flexibility are not associated with abdominal obesity the most among the women elderly population. Other muscular strength performances had no limited effects on abdominal obesity. Development of muscle strength in the elderly people should be emphasized and encouraged to maintain their functional abilities.

CHAPTER-7

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Appendix –A

Data collection Form

DATA COLLECTION FORM

NAME:

AGE:

GENDER:

WEIGHT:

HEIGHT:

BMI:

HIP-WAIST CIRCUMFERENCE:

STEP LENGTH	
STRIDE LENGTH	
CADANCE	

FUNTIONAL FITNESS:

TEST	**RIGHT**	**LEFT**
BACK SCRATCH TEST		
CHAIR SIT AND REACH TEST		

APPENDIX-D

MASTER CHART

SERIAL NO.	GENDER	AGE	HEIGHT (cm)	WEIGHT (kg)	BMI	HIP-WAIST CIRCUMFERENCE (cm)	STEP LENGTH (cm)	STRIDE LENGTH (cm)	CADANCE (step/min)	BACK SCARTCH RT (cm)	BACK SCARTCH LT (cm)	CHAIR SIT AND REACH TEST RT (cm)	CHAIR SIT AND REACH TEST LT (cm)
1	FEMALE	30	149	55	24.8	95	34	68	50	26.5	26	0	0
2	FEMALE	43	167	57	20.4	101	26.5	51	92	29	26	0	0
3	FEMALE	31	170	60	20.6	99	37	86	92	21	21	0	0
4	FEMALE	34	160	55	21.5	101	30	70	100	27	28	0	0
5	FEMALE	41	160	56	21.9	87	28	47.5	98	29	30	0	0
6	FEMALE	42	167	65	23.31	101	31	65	88	23	23	0	0
7	FEMALE	54	154	52	21.93	90	31	54	99	24	14	0	0
8	FEMALE	39	160	61	23.9	99	34	68	100	32	31	0	0
9	FEMALE	41	170	75	25.95	108	27	65	90	28	23	5	2
11	FEMALE	30	162	70	26.7	96	29	60	79	22	22	0	0
12	FEMALE	31	160	62	24.2	88	39	71	68	19	19	0	0
13	FEMALE	36	154	51	21.5	86	38	84	85	19	17	0	0
14	FEMALE	49	162	68	25.91	104	58	95	90	22	21	0	6.5
15	FEMALE	33	165	62	22.7	97	46	81	93	21	22	8	0
16	FEMALE	50	172	57	19.27	87	40	86	96	27	25	0	0
17	FEMALE	43	157	54	21.1	88	33	58	66	18	18	0	0
18	FEMALE	48	162	58	22.1	90	31	53	58	23	25	0	0
19	FEMALE	46	170	60	20.7	95	30	61	98	28	27	0	2
20	FEMALE	46	154	52	21.93	94	33	71	94	23	23	0	0
21	FEMALE	45	152	52	22.51	97	43	93	100	22	21	3	12
22	FEMALE	42	167	70	25.1	98	30	63	99	23	20	0	0
23	FEMALE	42	157	60	24.34	88	34	62	74	23	23	0	0
24	FEMALE	38	162	61	23.24	91	35	65	90	26	30	0	0
25	FEMALE	47	167	69	24.74	100	34	70	100	27	30	2	2
26	FEMALE	51	170	74	25.61	105	46	91	93	26	25	5	5
27	FEMALE	31	167	58	20.8	85	42	80	84	23	26	15	14
28	FEMALE	35	149	55	24.77	87	37	63	59	22	22	0	0
29	FEMALE	40	152	52	22.51	88	34	63	99	21	22	4	0
30	FEMALE	39	160	51	19.9	90	35	54	82	16	16	0	0
31	FEMALE	36	154	55	23.19	88	50	86	94	17	17	5	6
32	FEMALE	49	160	62	24.22	104	25	52	53	25	25	9	9
33	FEMALE	46	160	58	22.66	87	31	65	65	25	26	0	0
34	FEMALE	45	154	50	21.08	87	54	103	100	18	18	0	0
35	FEMALE	49	162	68	25.91	97	49.5	95	97	27	21	15	17
36	FEMALE	36	170	70	24.22	88	45	96	92	23	24	0	0
37	FEMALE	39	165	69	25.34	109	43	78.2	100	21	22	11	11
38	FEMALE	43	160	73	28.52	108	34	62	74	23	233	0	0
39	FEMALE	32	160	62	24.22	95	31.1	70	45	24	25	0	0
40	FEMALE	40	167	93	33.35	110	41.5	78.5	96	18	17	12	12

42	FEMALE	35	152	59	25.54	95.5	53	100	55	27	28	0	0
43	FEMALE	31	156	76	31.23	104	26	62	95	29	32	12	13
44	FEMALE	35	154	55	23.2	118	26	62	82	28	29	12	12
45	FEMALE	39	149	63	2.38	99	28.5	59	100	29	27	11	12
46	FEMALE	39	157	69	27.9	102	41	87	94	27	28	6	6
47	FEMALE	40	167	72	25.82	106	35	76.9	92	24	25	0	0
48	FEMALE	30	167	90	32.2	120	20	54	94	26	23	0	2
49	FEMALE	40	160	67	26.6	105	28	61.1	67	18	17	0	0
50	FEMALE	32	165	80	29.38	115	26	64	98	14	14	0	0
51	FEMALE	43	172	74	25.01	106	43	88	92	21	22	0	0
52	FEMALE	50	177	81	25.85	97	55	98	101	23	25	0	3
53	FEMALE	55	165	75	27.55	106	31	62	100	21	21	0	2
54	FEMALE	37	177	90	28.7	116	35	69	93	16	18	0	0
55	FEMALE	33	152	55	23.81	95	36	85	96	23	25	0	0
56	FEMALE	45	157	68	27.59	88	46	97	99	15	17	0	0
60	FEMALE	42	170	75	25.95	99	26	54	93	18	20	6	5
61	FEMALE	50	180	85	26.23	118	32	73	53	21	21	0	0
62	FEMALE	32	175	56	18.29	106	43	90	94	26	25	0	0
63	FEMALE	36	167	78	27.97	95	55	102	85	22	22	0	0
64	FEMALE	40	157	88	35.7	120	39	85	69	27	28	0	0
65	FEMALE	46	160	64	25	108	34	73	47	30	30	0	0
66	FEMALE	44	154	85	35.84	86	42	81	58	28	29	0	0
67	FEMALE	37	152	73	31.6	103	35	71	97	17	17	0	0
68	FEMALE	32	170	70	24.22	97	45	90	59	25	25	0	0
69	FEMALE	39	177	68	21.71	94	27	63	87	14	17	0	0
70	FEMALE	55	165	77	28.28	110	29	60	95	26	23	0	0
70	FEMALE	38	180	84	25.93	115	43	89	79	27	25	0	0
71	FEMALE	47	162	68	25.91	102	21	55	85	17	19	0	0
72	FEMALE	52	160	71	27.73	87	27	65	90	23	23	7	7
74	FEMALE	45	172	88	29.75	102	25	87	99	21	22	0	0

Appendix –C

Consent form

CONSENT FORM

I, RIZA AHSAN, am going to study, "**AN ASSOCIATION BETWEEN FUNTIONAL FITNESS, DETERMINANTS OF GAIT, AND ABDOMINAL OBESITY IN HEALTHY MIDDLE-AGED PEOPLE; AN OBSERVATIONAL STUDY**"

Department and university – Department of Physiotherapy, Integral University, Lucknow, Uttar Pradesh, India

Purpose of study – This study aims to check the prevalence of abdominal obesity in middle aged people and its effect on determinants of gait.

Risk – There is no negligibility, physical, mental, emotional, psychological, or social risk associated with this study.

Benefit – The study will help understand the effect of abdominal obesity on functional fitness and gait.

Confidentiality – Participants data will be kept confidential.

Declaration of Participants

I ……. of Age ……. Gender …… confirm that I have read and understood the information sheet for the above study. I understand that my participation is voluntary and I am free to withdraw at any time. I understand that any information given by me maybe used in future reports, articles.

I agree to take part in the above study.

Signature of participant Date:

Signature of Researcher Date:

Appendix –D

Raw data output

	AGE	*HEIGHT (cm)*	*WEIGHT (kg)*	*BMI*	*HIP-WAIST CIRCUMFERENCE (cm)*	*STEP LENGTH (cm)*	*STRIDE LENGTH (cm)*	*CADANCE (step/min)*	*BACK SCARTCH RT (cm)*	*BACK SCARTCH LT (cm)*	*CHAIR SIT AND REACH TEST RT (cm)*	*CHAIR SIT AND REACH TEST LT (cm)*
Mean	40.73913043	162.5797101	66.6087	24.77536	98.87681159	35.97246	73.14783	85.21739 13	23.1087	26.10145	2.144927536	2.326086957
Standard Error	0.809853053	0.940562174	1.345672	0.546264	1.141352724	1.046037	1.776387	1.925716568	0.505603	3.085949	0.500756 19	0.526556687
Median	40	162	67	24.77	98	34	70	92	23	23	0	0
Mode	39	160	55	24.22	88	34	65	100	23	25	0	0
Standard Deviation	6.727144692	7.812896196	11.17799	4.53761	9.48078777	8.689038	14.75578	15.99620319	4.199851	25.63382	4.159593314	4.373900834
Sample Variance	45.25447 57	61.04134697	124.9476	20.58991	89.88533674	75.49938	217.7331	255.8785166	17.63875	657.0925	17.30221654	19.13107417
Kurtosis	-0.771529634	-0.567711102	-0.52012	8.25713	-0.554676698	-0.16351	-1.02904	-0.000928622	-0.58218	65.03833	2.275982315	2.271952108
Skewness	0.203147254	0.269475747	0.535427	-1.23175	0.454943007	0.620669	0.33515	-1.125571121	-0.27892	7.951195	1.859012276	1.854449198
Range	25	31	43	33.46	35	38	55.5	56	18	219	15	17
Minimum	30	149	50	2.38	85	20	47.5	45	14	14	0	0
Maximum	55	180	93	35.84	120	58	103	101	32	233	15	17
Sum	2811	11218	4596	1709.5	6822.5	2482.1	5047.2	5880	1594.5	1801	148	160.5
Count	69	69	69	69	69	69	69	69	69	69	69	69
	mean	40.74	162.58	66.61	24.77			mean	23.108	26.101		

"AN ASSOCIATION BETWEEN FUNCTIONAL FITNESS, DETERMINANTS OF GAIT AND ABDOMINAL OBESITY IN HEALTHY MIDDLE-AGED FEMALES"

*Riza Ahsan – Research Scholar MPT(Musculoskeletal) Integral Institute of Allied Health Science & Research**

Guide: Dr. Tauseef Ahmad –(PT) Co-Guide: Dr. Abdur Raheem Khan.

Background and Purpose: the aim is to study the association between functional fitness, determinants of gait and cadence in healthy middle-aged females.

Study design:

Subjects: 70 females were taken in this study, there were selected on the basis of inclusion criteria. they should have abdominal obesity and hip –waist circumference was measured.

Result: The relationship between different functional fitness performance, cadence, determinanats of gait and abdominal obesity among middle age femals.the present study aimed to investigate the association between functional fitness test performance, determinants of gait and abdominal obesity in middle aged females. A total of 70 data from different area of Lucknow, Uttar Pradesh were collected, reviewed and analysed null hypothesis was accepted because there is no significant difference between abdominal obesity and determinants of gait, functional fitness, cadence.

Conclusion: In conclusion, according to the results of this study, body balance and flexibility are not associated with abdominal obesity the most among the women elderly population. Other muscular strength performances had no limited effects on abdominal obesity. Development of muscle strength in the elderly people should be emphasized and encouraged to maintain their functional abilities.

Keywords: functional capability, independent ability, abdominal obesity

INTRODUCTION

Obesity can be defined as excess body fat, and in epidemiological studies, the body mass index (BMI) is the standard measure used to characterize normal and overweight.[1]Obesity may lead to relevant comorbidities and severity which are proportional to excess body fat.[2] Studies indicate that there is a difference in the accumulation of body fat between the sexes; women have a significantly higher amount of total body fat than men of the same BMI.[3] Between 1980 and 2008, the average BMI in the world increased about 0.4 kg/m^2 per decade for men and 0.5 kg/m^2 per decade for women.[4]BMI is a person's weight in kilograms divided by the square of height in meters. A high BMI can indicate high body fatness.

If BMI is less than 18.5, it falls within the underweight range.

- If BMI is 18.5 to <25, it falls within the healthy weight range.
- If BMI is 25.0 to <30, it falls within the overweight range.
- If BMI is 30.0 or higher, it falls within the obesity range.

Obesity is frequently subdivided into categories:

- Class 1: BMI of 30 to < 35
- Class 2: BMI of 35 to < 40
- Class 3: BMI of 40 or higher. Class 3 obesity is sometimes categorized as "severe" obesity.

Normal (healthy weight)	From 18.5 to 25
Overweight from 25 to 30	From 25 to 30
Obese class I (moderately obese)	From 30 to 35
Obese class II (severely obese)	From 35 to 40
Obese class III (very severely obese)	Over 40

Table 1.1: WHO values for diagnosis of obesity according to BMI.

BMI does not measure body fat directly, but BMI is moderately correlated with more direct measures of body fat obtained from skinfold thickness measurements, bioelectrical impedance, underwater weighing, dual energy x-ray absorptiometry (DXA) and other methods [5.6.7]. Furthermore, BMI appears to be strongly correlated with various adverse health outcomes consistent with these more direct measures of body fatness [8,9,10,11,12]

The Waist-to-hip Ratio (WHR) looks at the proportion of fat stored on your body around your waist and hip. It is a simple but useful measure of fat distribution. The Waist Hip Ratio is calculated by dividing your waist measurement by your hip measurement,

since the hips are the widest part of your buttocks. The formula is: *WHR= waist circumference / hip circumference.* Having an apple shape (carrying extra weight around the stomach) is riskier for your health than having a pear shape (carrying extra weight around your hips or thighs). This is because body shape and health risks are linked. If you have more weight around your waist you have a greater risk of lifestyle related diseases such as heart disease and diabetes than those with weight around their hips. independence.[13] For example, exercises that mimic what patients did at home or work may be included in treatment in order to help them return to their lives or jobs after an injury or surgery. Thus, if a patient's job required repeatedly heavy lifting, rehabilitation would be targeted towards heavy lifting, if the patient were a parent of young children, it would be targeted towards moderate lifting and endurance, and if the patient were a marathon runner, training would be targeted towards re-building endurance. However, treatments are designed after careful consideration of the patient's condition, what he or she would like to achieve, and ensuring goals of treatment are realistic and achievable.

Ideally, women should have a waist-to-hip ratio of 0.8 or less, whereas men should have a waist-to-hip ratio of 0.95 or less. Functional fitness refers to Functional training has its origins in rehabilitation. Physical and occupational therapists and chiropractors often use this approach to retrain patients with movement disorders. Interventions are designed to incorporate task and context specific practice in areas meaningful to each patient, with an overall goal of functional

Functional training attempts to adapt or develop exercises which allow individuals to perform the activities of daily life more easily and without injuries.[14] Cadence is an essential ambulatory movement pattern and together with stride length delineate speed of ambulation. In this well-known relationship, cadence is the most overtly accessible (and therefore measurable) factor, and especially more so now given the growing availability

of wearable technologies capable of tracking this metric in real-time [15]

Aims and objectives:

- To find out the abdominal obesity in middle age females.
- estimate the association of abdominal obesity in middle aged females.
- To find out the correlation of abdominal obesity in middle aged females its functional fitness and determinants of gait.

Hypothesis:

Experimental Hypothesis:

- There will be effect of abdominal obesity will alter determinant of gait and functional fitness.

Null hypothesis:

There will be no effect of abdominal obesity and will alter determinants of gait and functional fitness.

Material and method

- Study design – observational study design
- Study population – age 20-30 years
- Study setting – Lucknow
- Sample size – 100-150 subject
- Sampling - Random sampling
- Time of duration – 3-4 months

Inclusion criteria:

- Able to walk without any kind of support
- Both male and female
- Person with abdominal obesity

Exclusion criteria:

- Any kind of medical emergency
- Any kind of injury or disease within past 2 weeks
- Other factors which may affect the efficacy of the test
- Any lower limb injury
- Diabetes
- Hypertension

Independent variables

- Cadence
- Speed
- Functional fitness

Dependent variables

- Abdominal obesity

Procedure

General instructions:

Subjects were instructed to wear comfortable clothing and walking shoes, and do not exercise within 2 hours prior of the test.

Step length and stride length:

The step length is the distance from the heel print of one foot to the heel print of the other foot during a walking stride. This is the distance traveled forward by a single leg. An average that you will see listed in many places is 2.2 feet (0.67 meters) for women and 2.5 feet (0.762 meters) for men, but it depends very much on height.[1]

Stride length can mean the same thing as step length, or it can mean the distance traveled by the heel of one foot to the next time that same foot strikes down. In other words, it is two steps since in that time the other foot has also touched down once

Cadence:

To measure your cadence is to count the times your feet hit the ground in 60 seconds. Cadence can also be defined as the number of steps one foot takes per minute. Usually 180 step/minutes is calculated.

hip- waist circumference:

- Stand up straight and breathe out. Use a tape measure to check the distance around the smallest part of your waist, just above your belly button. This is your waist circumference.
- Then measure the distance around the largest part of your hips — the widest part of your buttocks. This is your hip circumference.
- Calculate your WHR by dividing your waist circumference by your hip circumference.

Back scratch test:

The back-scratch test is a shoulder flexibility test used to evaluate the flexibility and mobility of your shoulder joint. The test can also be used to assess the range of motion (ROM) of your shoulder, including flexion and extension.

perform the back-scratch test by touching your palm to the opposite shoulder blade by bending your elbow above or below your shoulder. It can be a helpful test and stretch to perform before any upper-body sport workout or strength-training workout that

includes throwing, catching, or any shoulder movement.

Chair sit and reach test:

The subject sits on the edge a chair (placed against a wall for safety). One foot must remain flat on the floor. The other leg is extended forward with the knee straight, heel on the floor, and ankle bent at 90°. Place one hand on top of the other with tips of the middle fingers even. Instruct the subject to inhale, and then as they exhale, reach forward toward the toes by bending at the hip. Keep the back straight and head up. Avoid bouncing or quick movements, and never stretch to the point of pain. Keep the knee straight, and hold the reach for 2 seconds. The distance is measured between the tip of the fingertips and the toes. If the fingertips touch the toes then the score is zero. If they do not touch, measure the distance between the fingers and the toes (a negative score), if they overlap, measure by how much (a positive score).

Discussion

The present study aimed to investigate the associations between functional fitness test performance and abdominal obesity risk among healthy middle age females. Our result contained the data from 70 females and indicated that there is intercomparison between functional fitness test and age of females. first there shows no significance difference in lower limb flexibility test (chair sit and reach test). mean is 2.34 which shows no significance difference in test because females are more flexible to males and can-do activities without any stress. It is understandable that physically untrained populations commonly perform lower-limb and core muscle strength exercises, which are fundamental for body balancing. Some studies have implied that functional fitness exercise training is positively associated with body balance abilities among elderly people.[60] Moreover, studies have indicated that body balance ability is negatively associated with abdominal obesity.[61,62]

There is no significant difference in upper limb flexibility test (back scratch) the upper extremity muscular endurance scores of older adults with poor activity and physical fitness

scores revealed obesity as a critical indicator of health-related physical fitness performance.

There is no impact of cadence on abdominal obesity. The major findings are first that there was no difference between the weight groups in average daily step volumes. Second, there were significant differences between weight groups in some step cadence indices which suggest higher step intensities. Third, cadence strategies chosen to accumulate steps differed between weight groups and walking pattern parameters were significantly associated with anthropometric, health and socio-economic variables. There is significant effect of walking on abdominal obesity.[64]

There is no significant effect of determinants of gait on abdominal obesity. There is no effect on step length and stride length on abdominal obesity. Overweight participants had similar gait patterns with normal weight participants for all mechanical energy usages, while elongated gait phases such as ankle

But the subjects were early middle age and females are flexible so they can perform test.[63]

1st plantar flexion duration and stance duration were more similar between overweight and obese participants in maximum-speed walking. [65]

Limitation of the study

the study is limited to small sample size.

The study was done on only females' adults.

The study has limitation of hip to waist circumference as indicator of abdominal obesity.

The upper limb and lower limb flexibility test were limited to back scratch and chair sit and reach test.

Scope for future research

sample size could be more

the study could be done on both males and females' group

other indicators of abdominal obesity could be taken like skin fold measurement to be more accurate.

Conclusion

In conclusion, according to the results of this study, body balance and flexibility are not associated with abdominal obesity the most among the women elderly population. Other muscular strength performances had no limited effects on abdominal obesity. Development of muscle strength in the elderly people should be emphasized and encouraged to maintain their functional abilities.

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