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Assessing Responses of Functional Resistance Training on Selected Body Composition Variables Among Female Students

Jithin Das T K[1ABCDE], Sigamani Jayasingh Albert Chandrasekar[1ABCDE], Sooryajith K V[1BD] and Maneesha Abraham[2CD]

[1]SRM Institute of Science and Technology
[2]University of Calicut

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Corresponding Author: Jithin Das T K, e-mail: jithindastk@gmail.com
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Abstract

Objectives. This study aimed to examine the responses of incorporating functional resistance training program and to ascertain the impact of this structured program on body composition variables among female students.

Materials and Methods. For this study, 20 interested female students (age: 22.15 ± 1.95 years) from the SRM IST in Kattankulathur, Chennai, were selected as participants. After baseline measurements, participants were randomized into training (n = 10) and control (n = 10) groups. The experimental group engaged in an 8-week training program comprising 40–60 minutes of low-to-moderate intensity functional resistance training. Body composition variables such as weight, BMI, and waist-hip ratio were chosen as dependent variables for the study. To assess the baseline group differences, independent sample t-tests were used. Intervention effects were examined by paired sample t-tests to determine within-group effect of college students, including body weight, BMI and WHR. The significance level was set at 0.05.

Results. The paired sample t-test showed a significant difference ($p < 0.05$) in body composition among the experimental group. The pre and post-test values were considerably different ($p < 0.05$) in the training group. According to the findings, it was revealed that functional resistance program led to marked decreases ($p < 0.05$) in weight, BMI and WHR. However, no substantial differences were found in the control group.

Conclusions. The study concluded that after eight weeks of engaging in FRT programme, significant improved responses were observed in body composition variables such as weight, BMI, and waist-hip ratio among female students.

Keywords: functional resistance training, body composition, female students.

Introduction

Physical fitness and healthy body composition are vital signs of total wellbeing, especially among young women (Kochman et al., 2022; Fernández-García et al., 2020). In today's modern lifestyle, lack of physical activity and unhealthy eating habits are more common, particularly in young adults, leading to raise in obesity, metabolic syndrome, and life style diseases (Alexander et al., 2017; Chomiuk et al., 2024; Godala et al., 2022) Particularly in college women students, stress in the academic life, decreased physical activity, and rise in sedentary behaviour have led to negative trends in health and fitness (Celestine et al., 2017; Arya et al., 2024). And also regular physical activity has been shown to improve overall health, yet finding the time to exercise is still a big obstacle for many people (Warburton et al., 2006; O'Dougherty et al., 2012). As a result, there is an important need to adopt sustained and effective training program that not only to enhance fitness but also positively affect body composition, an important indicator of physical health and diseases risk.

Body composition variables serve as vital indicators for measuring the effectiveness of fitness regimen (Godoy-Cumillaf et al., 2025). An unfavourable body composition, especially high fat mass or abdominal fat, is closely associated with a greater risk of musculoskeletal problems, coronary diseases, and diabetes problems (Dutta et al., 2006; Kim et al., 2019). For young adult women, keeping a healthy body com-

position is also crucial for balancing hormone, reproductive health, and mental health, including enhanced self-esteem and body image (Segarra I et al., 2023; Moncur, 2011).

With the increasing popularity of functional and time efficient workout programs, FRT (Functional Resistance Training) has risen as popular and effective workout (Brogno B, 2025). Unlike traditional resistance training, which frequently uses free weights and machines to isolate muscle, FRT include multi-planar and compound movements that imitate daily activities (Zuo et al., 2022; Khazaei et al., 2023). These movements engage more than one muscle groups concurrently, developing strength, stability, balance, neuromuscular coordination and overall performance (Liao et al., 2019; Akbar et al., 2022). Exercises such as squats, lunges, push-pull, and rotational lifts are the keystone of FRT, providing a practical and holistic approach to fitness (Kompf et al., 2022; Faro et al., 2019; Feito et al., 2018).

In previous studies have shown that resistance training can significantly effects body composition by increasing body mass and reducing fat mass (Lopez et al., 2022; Liu et al., 2022; Wewege et al., 2019). However, the majority of the studies have mostly focused on male populations or traditional resistance methods. Only few studies are concentrated on FRT. There remains a research gap in the previous studies concerning the effect of functional resistance training on body composition among female college students, they are in a unique demographic with particular lifestyle, physiological traits and motivational characteristics. In this context, our study aims to investigate effect of functional resistance training program on selected body composition variables among women students. By focusing on this demographic, the study seeks to insight on how FRT can serve as a useful intervention not only for enhancing fitness and health, and also for avoiding metabolic disorders and obesity at early stage. The findings may inform physical trainers, health educators, and physical education teachers in creating effective and safe training program tailored to the young women.

Materials and Methods

Participants

There were 20 interested women students (age: 22.15 ± 1.95 years) selected from the SRM IST, Kattankulathur, Chennai for this study. Most of the subjects were actively engaged in recreational activities and had prior resistance training experience, but none of the participants frequently performed resistance training. Clinical history and physical examinations were used to determine eligibility. A history of chronic illnesses (diabetes, cardiorespiratory issues or metabolic abnormalities) or any other condition that would have made it difficult to follow exercise regimens was one of the study's exclusion criteria. All the participants received a detail explanation about the training program and purpose of this study, and their oral consent was also collected.

Experimental Design

The participants were divided in to two groups at random, including FRT group and control group. The FRT group participated 8 weeks training period and control group not involved in specific training. Pre and post-test are conducted before and after the training programme. Below given flow chart detailing study's procedure.

Training Protocol

The participants were trained in eight consecutive weeks which includes five sessions per week, each training sessions lasts nearly 40-60 minutes. Before and after the main exercise, the training protocols comprised static and dynamic stretching as part of the conventional warm-up and cool-down.

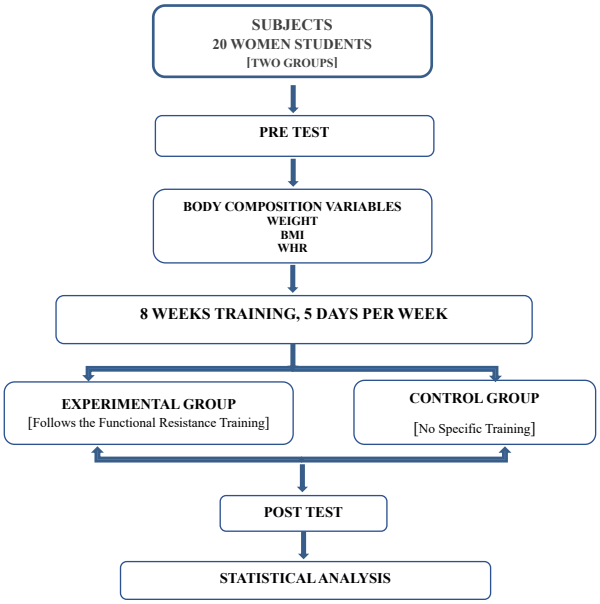

Fig. 1. Shows Flow chart of experimental design

The warm- up lasts nearly 10 minutes, it includes stretching exercises and jumping exercises like jumping jacks, high knee, back kicks. The whole body FRT performed different exercises lasts 25 to 30 minutes, Exercises included squats, push ups, lunges, crunches, plank, rowing, presses, swings and lifts. In a session participants were performed eight exercises with two sets of 8 to 10 repetition and gradually the repetition increased 10 to 12 in after two weeks. In the beginning of fifth weeks number of sets were increased in to 3 sets and repetition at 8 to 10 and gradually increased in to 10-12. Warm down includes loosening exercises and stretching.

Criterion Measures

Body composition variable such as Weight, BMI, and WHR were measured with the help of 'Inbody 770 Body Composition Analyser'.

Statistical Analysis

For assess the baseline group differences, Independent sample t-test were used. Intervention effects were examined by paired sample t-tests to determine within group effect such as Body weight, BMI and WHR of college students. 0.05 level was set for significance level.

Results

Table 1. Output of independent t test for identifying Base line group difference of experimental and control group on selected variables

Body Composition Variables	Group	Mean (SD)	t	p
WEIGHT	EG	49.70 (4.61)	0.506	0.619
	CG	50.56 (2.76)		
BMI	EG	20.98 (1.75)	0.533	0.601
	CG	20.55 (1.86)		
WHR	EG	0.750 (0.032)	0.535	0.600
	CG	0.742 (0.034)		

Note: EG = Experimental group, CG = Control group, Data are presented as Mean ± SD, BMI-body mass index, WHR-waist hip ratio, df = 9, Level of significance = 0.05.

There were no significant variations in terms of the Body Weight, BMI and WHR of college students between trained and control group before training (Table 1). Average Body Weight of Experimental group and Control group is 49.70 & 50.56, Average BMI level of Experimental group and Control group is 20.98 & 20.55 and the WHR of Experimental group and Control group is .750 & .742, respectively. All the p value is greater than 0.05(p = .619, .601, & .600> 0.05). The output of independent t test result shows that there is no significance different between these two groups. The body weight, BMI and WHR of experimental group(n = 10) and control group (n = 10) were similar before training.

Table 2. Output of paired t test for analysing before and after the intervention of experimental and control Groups

Variables	Group	Pre-test mean (SD)	Post-test mean (SD)	t	p
WEIGHT	EG	49.70 (4.61)	48.82(4.51)	8.63	0.000
	CG	50.56 (2.76)	50.43(2.78)	1.22	0.253
BMI	EG	20.98(1.75)	20.27(1.71)	6.91	0.000
	CG	20.55(1.86)	20.47(1.86)	0.784	0.453
WHR	EG	0.750(0.032)	0.731(0.024)	4.67	0.001.
	CG	0.742(0.035)	0.738(0.032)	1.81	0.104

EG = Experimental group, CG = Control group, Data are presented as Mean ± SD, BMI-body mass index, WHR-waist hip ratio, df = 9, Level of significance = 0.05.

Table 2 (output of paired sample t test) presents the mean of pre- and post-training values for the Body Weight, Body Mass Index (BMI) and Waist Hip Ratio (WHR) of experimental and control groups. There were statistically no significant differences pre- and post-training values in the control group (p = .253, .453, .104 > 0.05). There were statistically significant differences pre- and post-training values of the variables such as Body Weight, BMI and WHR only in the training group (p = .00, .000, .001 < 0.05). In the Experimental/ Training group, Body Weight (before intervention = 49.70, after intervention = 48.82), BMI (before intervention = 20.98, after intervention = 20.27), and WHR (before intervention = .750, after intervention = .731) decreased with functional resistance training.

Discussion

The study objective was to investigate the impact of a structured functional resistance training program on body composition variables such as weight, BMI and waist Hip Ratio among women students. After the statistical analysis, the result findings show that there were significant differences in pre- and post-training values of chosen variables only in the training group. But, there were statistically no significant differences in pre- and post-training values of the control group. The study results indicate that the FRT group, compared to the control group, was more effective in differences in body composition.

Our findings are confirm with previous studies state that functional resistance training has positive on body composition, a study found that Functional Strength Training was more successful than Traditional Strength Training at reducing fat mass, when comparing the impact of 8 weeks of FST and TST on the body composition of older women (de Resende-Neto et al., 2019). In another study, the results were similar to our study, pointed that training group was more effective than control group in improving body composition and specifically, training group significantly improved body mass, body fat percentage and BMI (Wang et al., 2024). A study conducted on elderly women, it was shown that six month of FST might also effectively enhance BMI (Liao, et al., 2019). Moreover, there have so many previous studies related to resistance training on body compositions that shows RT with outdoor fitness equipment's twice a week for 8 weeks can significantly improve body composition (Marcos-Pardo, P. J. et al., 2024). Moreover, a study conducted on obese college students shows that RT with load can help improve the body composition and noticed significant changes in body weight, BMI and waist hip ratio (Liu, W. J., & Ma, H. T., 2023). Previous study on untrained male adults shows that RT had a better effect in significantly improve in body composition (Kashiani et al., 2020). Thus, in these studies indicate that the positive effect of functional resistance training on body composition. So, this study finding suggests that Functional resistance training is a safe, effective, and practical intervention for enhancing body composition among women students. Considering time constraints and academic stress of the students, FRT offers time efficient training program that combines cardiovascular and muscular benefits. These advantages that make FRT an attractive for physical education professionals, health educators, and trainers to improve fitness participation of female and combat sedentary life. FRT also has psychological advantages, as developments in physical appearance and can enhance motivation and self-esteem among young women.

The study produced positive results, but there has several limitations. The sample size was small, that can restrict generalizability of the findings. Proper diet and lifestyle factors were not controlled, which could have influenced outcomes. Moreover, the study focused on basic body composition variables, Future research could use more variables and different technique for measurements. It is recommended that future studies should advised to use loner training periods, and include nutritional control, investigating physical and psychological variables.

Conclusions

Considering the results of this investigation, the study shows that functional resistance training favours body

composition variables among college women students. The study concluded that after the eight weeks of FRT programme shows there were significant responses in the body composition variables such as Weight, BMI, and Waist hip ratio among women students.

Conflict of Interest

The author states that there are no conflicts of interest regarding the publication of this manuscript

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Оцінка реакцій щодо проведення функціонального силового тренування на певні показники композиції тіла серед студентів жіночої статі

Джітін Дас Т. К.[1ABCDE], Сігамані Джаясінґх Альберт Чандрасекар[1ABCDE], Сур›яджіт К. В.[1BD], Маніша Абрахам[2CD]

[1]Інститут науки й технологій SRM
[2]Університет Калікут

Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 7 с., 2 табл., 1 рис., 30 джерел.

Мета дослідження. Мета цього дослідження полягала у вивченні реакцій щодо впровадження програми функціональних силових тренувань та визначенні впливу зазначеної структурованої програми на показники композиції тіла серед студенток.

Матеріали та методи. Для проведення цього дослідження було відібрано 20 зацікавлених студентів жіночої статі (вік: 22.15 ± 1.95 роки), які навчалися в Інституті науки і технологій імені Шрі Рамасвамі у місті Каттанкулатур, Ченнай. Після вимірювання вихідних показників, учасниць було рандомізовано на тренувальну (n = 10) та контрольну (n = 10) групи. Експериментальна група брала участь у 8-тижневій програмі тренувань, що складалася з 40–60 хвилин функціональних силових тренувань низької та помірної інтенсивності. В якості залежних змінних для дослідження було обрано такі показники складу тіла, як вага, ІМТ та співвідношення талії і стегон. З метою оцінки базових групових відмінностей використовувались t-критерії для незалежних вибірок. Інтервенційні ефекти досліджувались за допомогою t-критеріїв для парних вибірок задля визначення внутрішньогрупового впливу університетських студентів, включаючи масу тіла, ІМТ та СТС. Рівень значущості було встановлено на позначці 0.05.

Результати. Т-критерій для парних вибірок показав значну різницю ($p < 0.05$) у показниках композиції тіла серед учасниць експериментальної групи. У тренувальній групі значення показників перед початком і після завершення ви-

пробування суттєво відрізнялися ($p < 0.05$). Згідно з отриманими результатами, встановлено, що виконання програми з функціонального силового тренування призвело до вираженого зниження ($p < 0.05$) ваги, ІМТ та СТС. Однак у контрольній групі суттєвих відмінностей виявлено не було.

Висновки. У дослідженні зроблено висновок, що після восьми тижнів участі в програмі функціональних силових тренувань у студенток спостерігалися значні покращення реакцій щодо показників складу тіла, як-от вага, ІМТ й співвідношення талії та стегон.

Ключові слова: функціональне силове тренування, композиція тіла, студенти жіночої статі.

Information about the authors:

Jithin Das T K: jithindastk@gmail.com; https://orcid.org/0009-0009-2297-7289; Department of Physical Education and Sports Sciences, Faculty of Science and Humanities, SRM Institute of Science and Technology, Kattankulathur, Tamilnadu, India.

Albert Chandrasekar, Sigamani Jayasingh: jayasins@srmist.edu.in; https://orcid.org/0000-0001-7299-4647; Department of Physical Education and Sports Sciences, Faculty of Science and Humanities, SRM Institute of Science and Technology, Kattankulathur, Tamilnadu, India.

Sooryajith K V: sooryamanu08@gmail.com; https://orcid.org/0000-0002-3190-2758; Department of Physical Education and Sports Sciences, Faculty of Science and Humanities, SRM Institute of Science and Technology, Kattankulathur, Tamilnadu, India.

Maneesha Abraham: maneeshaabraham@gmail.com; https://orcid.org/0009-0004-9676-823X; Department of Physical Education, University of Calicut, Kerala, India.

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