International Journal of Health Sciences and Research
Volume 14; Issue: 5; May 2024
Website: www.ijhsr.org
Original Research Article *ISSN: 2249-9571*

Effectiveness of SAIL (Stay Active and Independent for Life) Protocol on Functional Mobility in Older Adults with Sarcopenic Obesity - A Quasi-Experimental Study

Gargi Lalit Kandalgaonkar[1], Jahnvi Panwar (PT)[2]

[1]BPT intern, Modern College of Physiotherapy, Shivajinagar, Pune. Maharashtra, India,
[2]Associate Professor, Modern College of Physiotherapy, Shivajinagar, Pune. Maharashtra, India

Corresponding Author: Gargi Kandalgaonkar

DOI: https://doi.org/10.52403/ijhsr.20240544

ABSTRACT

BACKGROUND: The aging process combined with co-morbid factors like sarcopenic obesity can lead to reduced functional mobility. A regular and diverse exercise protocol is necessary to maintain functional mobility.
AIM: The aim of this study was to find the effectiveness of SAIL (Stay Active and Independent for life) protocol on functional mobility in older adults with sarcopenic obesity using SPPB scores after 4 weeks duration (3 alternate days a week for 55-60 mins).
METHOD: The experimental study was carried out among 30 older adults of which 11 were males and 19 were females. They were selected according to the study criteria. Written consent was taken. Effect of SAIL protocol on functional mobility of older adults was analyzed using appropriate parametric tests. Analysis was done using Microsoft excel and Graphpad.
RESULT: The SPPB values after the intervention showed p value of 0.0059 which is considered very statistically significant.
CONCLUSION: The study concluded that the Stay Active and Independent for Life (SAIL) protocol positively improves the functional mobility among older adults with sarcopenic obesity as evidenced by the Short Physical Performance Battery scores.

Keywords: Sarcopenic obesity, functional mobility, older adults, intervention

INTRODUCTION

Sarcopenic obesity (SO) is a clinical and functional condition characterized by the coexistence of obesity and sarcopenia. [1]
Sarcopenia is the loss of muscle mass and obesity is characterized by excess fat mass. Loss of skeletal muscle mass combined with relative or absolute fat gain occurs very commonly with aging.
Obesity in itself can also lead to loss of muscle mass and function due to the negative impact of adipose tissue-dependent metabolic derangements, such as inflammation and insulin resistance and oxidative stress which can cause a negative effect on muscle mass.[1]
The main causes of sarcopenic obesity are:
Inflammation: The adipose tissue is an active metabolic tissue which secretes hormones and proteins. It produces IL- 6 and TNF-α, which up-regulate the inflammatory process. This creates a vicious cycle of reduction in muscle strength in obese people.
Insulin resistance: Studies have shown that insulin resistance is an independent correlate of poor muscle strength and older diabetic

patients show accelerated loss of leg muscle strength and quality. Resistance training improves insulin sensitivity and glycemic control.

Sedentary lifestyle: Muscle atrophy due to physical inactivity may lead to reduction in metabolic rate and further aggravate weight gain and muscle atrophy.

Oxidative stress

A sedentary lifestyle is one of the major causes of both sarcopenia and obesity and is aggravated by comorbidities.

From a clinical standpoint, sarcopenic obesity can lead to a cumulative risk due to two different clinical conditions that are co-related. This may lead to reduced mobility, dependency and disability.[2]

Sarcopenia may directly facilitate fat accumulation through reduced total energy expenditure, and obesity and sarcopenia may therefore synergistically enhance one another with vicious cycling of fat gains and muscle loss through reduced mobility, dependency and disability. [2]

'Functional mobility' is the physiological ability of people to move independently and safely in a variety of environments in order to accomplish functional activities or tasks and to participate in activities of daily living (ADL), at home, work and in the community. It includes movements like standing, bending, walking and climbing, which are the building blocks of ADL, and hence crucial to an individual's independent living and global health status. Impaired functional mobility has been found to be associated with a greater risk of falls, loss of independence, and institutionalization. [3]

The SAIL protocol, Stay Active and Independent for Life (SAIL) is a group exercise program,

which includes strength, balance and endurance training for adults aged 65

years and older.[4] Sessions are conducted 3 times per week for 60 minutes. All exercises are performed in standing, with modifications in sitting for people who are occasional cane or walker users. SAIL can accommodate people with a mild level of mobility difficulty. It is an evidence-based exercise program listed as a fall prevention strategy, by the National Council of Aging based on guidelines by CDC and Cochrane review.

The components of the SAIL protocol consist of:

- Warm-up (3-5 mins)
- Aerobics (18-20 mins)
- Balance exercises (Mandatory) (10 mins)
- Strength exercises (Mandatory) (15-18 mins)
- Stretching and fall prevention education (8-10 mins)

Resistance training is considered an important strategy to counter sarcopenia; they promote satellite cells activation and proliferation and enhance muscle protein synthesis while inhibiting their breakdown, resulting in increased skeletal muscle mass and strength.[5]

The aim of this study to find the effectiveness of SAIL (Stay Active and Independent for life) protocol on functional mobility in older adults with sarcopenic obesity using SPPB scores after 4 weeks duration (3 alternate days a week for 60 mins).

MATERIALS & METHODS

Study design -Experimental study

Sample size – 30

Sampling method - Purposive sampling

Source – Housing societies in an around the city

Intervention duration- 4 weeks, 3 days a week, 55-60 mins per day.

Selection criteria:

Inclusion criteria:

1. In the age group of 65-75 years.
2. Both males and females
3. With obesity - BMI ≥30 kg/m2
4. With body fat % - in men ≥ 25%
   - in women ≥ 35% [9,13]
5. Combined with sarcopenia – SARC-F score ≥4 points.

Exclusion criteria:

1. Unstable cardiac diseases
2. Chronic Respiratory diseases
3. Difficulty in comprehension
4. Cases of uncontrolled Diabetes mellitus and Hypertension

5. Recent musculoskeletal injuries or disabilities

Procedure:

The participants were selected according to the selection criteria. A written consent form was signed. Pre SPPB scores were taken and a supervised SAIL protocol was administered for 4 weeks. The post SPPB scores were taken. Data was recorded and statistical analysis was done.

Outcome measure: Short physical performance battery (SPPB)

Interrater reliability of the SPPB (ICC = 0.81 to 0.91) [15]

It is an objective measurement instrument of balance, lower extremity
strength, and functional capacity in older adults (>65 years of age). The
test includes three different domains (walking, sit-to-stand and balance)
to assess functional mobility.

SPPB scores split into the following categories:

Very Low (0–3), Low (4–6), Moderate (7–9), High (10–12)

RESULT

This study evaluated 30 subjects out of which 11 were males and 19 were females with a mean age of 70.8. The subjects were taken and pre and post functional mobility was assessed using the Short Physical Performance Battery (SPPB). The exercise protocol was carried out for 3 days per week for 4 weeks.

Data was analyzed using Microsoft Excel and GraphPad for drawing the conclusion of the study. Paired t-test was used to get the difference between pre and post values. The various statistical measures such as mean, standard
deviation and test of significance were utilized to analyze the data. The results were concluded to be statistically significant, if p value is less than 0.05. The data was represented in both tabular and graphical format.

The pie chart 1 has been created showing the distribution of gender relative to the total number of participants. The number of female participants were 19 and males were 11, constituting 63% and 37% of the total sample size respectively. [Figure 1]

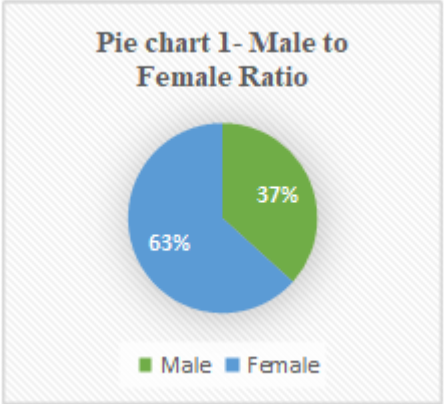

Figure 1: Male to female ratio

The bar graph compares the mean SPPB values pre and post intervention. (Figure 2)
The mean pre SPPB scores being 7.00 and post being 7.233333(± 1.87).

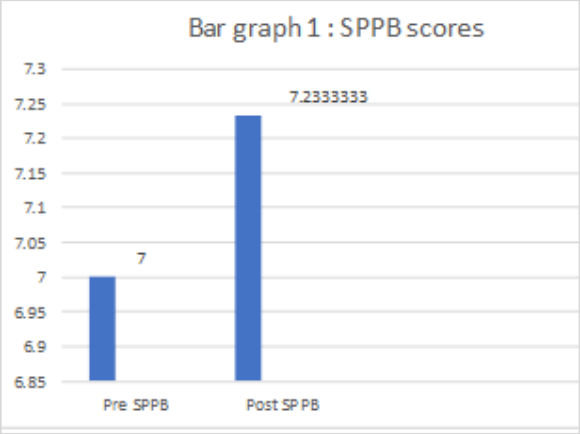

Figure 2: Mean SPPB scores

The SPPB values after the intervention showed very statistically significance (p=0.0059, 95% confidence interval: -0.39 to -0.07) and thus the SAIL protocol is effective in improving functional mobility of older adults with sarcopenic obesity. [Table 1]

The mean value of SPPB post protocol is greater than pre SPPB indicating an improvement in functional mobility of the participants.

Table 1: Effect of SAIL protocol on functional mobility using SPPB scores

Short Physical Performance Battery (SPPB)	Pre intervention mean score + SD	Post intervention mean score + SD	T Value	P value	Result
	7 + 1.84	7.233 + 1.87	2.9709	0.0059	Very significant

DISCUSSION

This study examined the effectiveness of the SAIL (Stay active and independent for life) protocol on the functional mobility of older adults with sarcopenic obesity. A total of 30 individuals both male and female participated in this study. The significant improvement in functional mobility observed in our study supports the hypothesis that targeted exercise interventions can positively impact the physical functioning of older adults with sarcopenic obesity. A significant change was seen in the SPPB (Short physical performance battery) scores of the participants after 4 weeks of intervention with a p-value of 0.0059 which is considered very statistically significant. This improvement in functional mobility may be rooted in the physiological and biological mechanisms activated by the SAIL protocol's comprehensive approach, which encompasses resistance training and aerobic components.

Donini L, et al stated that sarcopenia may directly facilitate fat accumulation through reduced total energy expenditure, and obesity and sarcopenia may therefore synergistically enhance one another with vicious cycling of fat gains and muscle loss through reduced mobility, dependency and disability. Impaired functional mobility has been found to be associated with a greater risk of falls, loss of independence, and institutionalization.[2]

Gadelha, André Bonadias et al stated that resistance training is considered an important strategy to counter sarcopenia; they promote satellite cells activation and proliferation and enhance muscle protein synthesis while inhibiting their breakdown, resulting in increased skeletal muscle mass and strength.[5]

Dieli-Conwright et al stated that aerobic exercise has traditionally been viewed as the main mode of exercise that is effective at reducing waist circumference, fasting glucose, HDL-C, and TGs.[11]

The SAIL protocol demonstrates several advantages over other interventions. Its holistic approach, emphasizing not just physical but also cognitive and social components, potentially offers a more comprehensive strategy for addressing sarcopenic obesity in older adults.

The effectiveness of the SAIL protocol in improving functional mobility aligns with previous research highlighting the benefits of combined exercise interventions in older adults. The significant improvement in functional mobility observed in our study supports the hypothesis that targeted exercise interventions can positively impact the physical functioning of older adults with sarcopenic obesity.

From a practical perspective, these findings can help healthcare providers develop specific exercise interventions aimed at promoting healthy aging and preserving independence in this population. However, this study is not without its limitations, including its relatively small sample size and the short duration of the intervention. These factors may affect the generalizability of the findings and underscore the need for further research.

Future studies with larger, more diverse samples will help to validate the effectiveness of the SAIL protocol across different settings and populations. Future research should aim to replicate these findings in larger, more diverse cohorts over longer periods to examine the sustainability of improvements in functional mobility. Additionally, exploring the cost-effectiveness of the SAIL protocol could provide valuable insights into its potential for broader implementation in public health initiatives. The implications of this study extend beyond individual health outcomes, suggesting potential pathways for policy

development aimed at supporting healthy aging. Encouraging the integration of programs like the SAIL protocol into community and healthcare settings could serve as a preventive strategy against the decline in mobility and independence among older adults. In conclusion, our study provides evidence supporting the effectiveness of the SAIL protocol in improving functional mobility in older adults with sarcopenic obesity. These findings have important implications for the development of targeted exercise interventions aimed at promoting healthy aging and preserving independence in this population.

CONCLUSION

The study concluded that the Stay Active and Independent for Life (SAIL) protocol positively improves the functional mobility among older adults with sarcopenic obesity as evidenced by the Short Physical Performance Battery scores.

Hence, we accept our (H1) hypothesis that there will be a significant effect of SAIL protocol on the functional mobility of older adults with sarcopenic obesity and the null hypothesis is rejected.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Ji, Tong et al. “Sarcopenic Obesity: An Emerging Public Health Problem.” Aging and disease vol. 13,2 379-388. 1 Apr. 2022, doi:10.14336/AD.2021.1006
2. Donini L, et al.: “Definition and Diagnostic Criteria for Sarcopenic Obesity”: ESPEN and EASO Consensus Statement. Obese Facts 2022; 15:321- 335. doi: 10.1159/000521241
3. Bouça-Machado R, Maetzler W, Ferreira JJ. What is Functional Mobility Applied to Parkinson's Disease? J Parkinsons Dis. 2018;8(1):121-130. doi: 10.3233/JPD-171233. PMID: 29480225; PMCID: PMC5836402.
4. York, Sally C et al. “A translational research evaluation of the Stay Active and Independent for Life (SAIL) community-based fall prevention exercise and education program.” Health promotion practice vol. 12,6 (2011): 832-9. doi:10.1177/1524839910375026
5. Gadelha, André Bonadias et al. “Effects of resistance training on sarcopenic obesity index in older women: A randomized controlled trial.” Archives of gerontology and geriatrics vol. 65 (2016): 168-73. doi: 10.1016/j.archger.2016.03.017
6. Batsis, John A et al. “Sarcopenia, sarcopenic obesity, and functional impairments in older adults: National Health and Nutrition Examination Surveys 1999-2004.” Nutrition research (New York, N.Y.) vol. 35,12 (2015): 1031-9. doi: 10.1016/j.nutres.2015.09.003
7. Gao, Qianqian et al. “Global prevalence of sarcopenic obesity in older adults: A systematic review and meta-analysis.” Clinical nutrition (Edinburgh, Scotland) vol. 40,7 (2021): 4633-4641. doi: 10.1016/j.clnu.2021.06.009
8. Pal, Rimesh et al. “The prevalence of sarcopenic obesity in community- dwelling healthy Indian adults - The Sarcopenic Obesity-Chandigarh Urban Bone Epidemiological Study (SO-CUBES).” Osteoporosis and sarcopenia vol. 7,1 (2021): 24-29. doi: 10.1016/j.afos.2020.12.003
9. Stenholm, Sari et al. “Sarcopenic obesity: definition, cause and consequences.” Current opinion in clinical nutrition and metabolic care vol. 11,6 (2008): 693-700. doi:10.1097/MCO.0b013e328312c37d
10. Stenholm, S et al. “The effect of obesity combined with low muscle strength on decline in mobility in older persons: results from the InCHIANTI study.” International journal of obesity (2005) vol. 33,6 (2009): 635-44. doi:10.1038/ijo.2009.62
11. Dieli-Conwright, Christina M et al. “Effects of Aerobic and Resistance Exercise on Metabolic Syndrome, Sarcopenic Obesity, and Circulating Biomarkers in Overweight or Obese Survivors of Breast Cancer: A Randomized Controlled Trial.” Journal of clinical oncology: official journal of the American Society of Clinical Oncology vol. 36,9 (2018): 875-883.

12. Evidence-Based Program: Stay Active & Independent for Life (SAIL) Program, Sep 03, 2020, National Council Of Aging, available at https://www.ncoa.org/article/evidence-based-program-stay-active-independent-for-life-the-sail-program
13. ACSM's Guidelines for Exercise Testing and Prescription, American College of Sports Medicine, 8th edition, p.64
14. Malmstrom TK, Morley JE. SARC-F: a simple questionnaire to rapidly diagnose sarcopenia. Journal of the American Medical Directors Association. 2013 Aug 1;14(8):531-2.
15. Gómez, José Fernando et al. "Validity and reliability of the Short Physical Performance Battery (SPPB): a pilot study on mobility in the Colombian Andes." Colombia medica (Cali, Colombia) vol. 44,3 165-71. 30 Sep. 2013

How to cite this article: Gargi Lalit Kandalgaonkar, Jahnvi Panwar. Effectiveness of SAIL (stay active and independent for life) protocol on functional mobility in older adults with sarcopenic obesity– a quasi-experimental study. *Int J Health Sci Res.* 2024; 14(5): 339-344. DOI: *https://doi.org/10.52403/ijhsr.20240544*

******