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ORIGINAL ARTICLE

Correlation of Physical Activity with Cognitive Function, Agility and Quality of Life among Post-menopausal women: A Pilot Study

Samuel Sanjay Eapen[1], Khandige Ganesh Kumar[2], Rosa V T[3]

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ABSTRACT

Background: Menopause is associated with hormonal changes that may impair cognitive function, physical performance, and quality of life. Physical activity is a modifiable risk factor that may reduce age-related changes.

Aims: This study aimed to assess the physical activity, cognitive function, agility, and quality of life of postmenopausal women and to evaluate the interrelationships among these variables.

Settings and Design: A pilot study was conducted among community-living women in Southern Karnataka.

Methods and Materials: Postmenopausal women aged ≥50 years with at least 12 months of menopause were recruited using convenience sampling. Physical activity, cognitive function, agility, and quality of life were assessed using the International Physical Activity Questionnaire Short Form, Montreal Cognitive Assessment, 8-Foot Up-and-Go Test, and Menopause-Specific Quality of Life Questionnaire, respectively.

Statistical Analysis Used: Data were analysed using SPSS version 29.0. Descriptive statistics and Karl Pearson's correlation coefficient were used. Statistical significance was set at $P < 0.05$.

Results: Physical activity showed a very weak positive correlation with cognitive function ($r=0.032$, $p=0.906$) and a moderate positive correlation with agility

AUTHOR'S AFFILIATION:

[1] Professor & Principal, Department of Physiotherapy, Laxmi Memorial College of Physiotherapy, Mangaluru, Karnataka, India.

[2] Professor, Department of General Medicine, A. J Institute of Medical Sciences, Mangaluru, Karnataka, India.

[3] Post Graduate Student, Laxmi Memorial College of Physiotherapy, Mangaluru, Karnataka, India.

CORRESPONDING AUTHOR:

Rosa V T, Post Graduate Student, Laxmi Memorial College of Physiotherapy, Mangaluru, Karnataka, India.

E-mail: divyarosavt19@gmail.com

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(r=0.484, p=0.057). A moderate negative correlation was observed with the vasomotor domain of QoL (r=-0.604, p=0.013). No correlations were found between the psychosocial, physical, sexual, or overall QoL domains.

Conclusions: Higher physical activity levels were associated with improved vasomotor QoL. However, no significant association was observed between physical activity and cognitive function, agility, or QoL. Further studies are required to confirm these findings.

KEYWORDS

• Agility • Cognitive Function • Physical Activity • Postmenopausal Women • Quality of Life

INTRODUCTION

Menopause marks the permanent cessation of menstrual cycling and is clinically defined as the absence of menses for 12 months.[1] Consequently, the perimenopause and early post-menopause overlap, as women are recognised as postmenopausal from the moment of their final menstrual period, which can only be retrospectively identified.[2] Worldwide, the normal age range for natural menopause is between 45 and 55 years. Presently, the average age of women at menopause is about 51 years in industrialised countries, whereas in developing countries, it ranges from 43 to 49 years.[3]

The characteristics and prevalence of menopausal symptoms are similar for most women; there may be cultural variations across and within countries, mainly as a result of differences in lifestyle, socioeconomic status and self-perception.[4]

Physical activity (PA) is associated with numerous health benefits, including a decreased risk of cardiovascular diseases, metabolic syndromes, osteoporosis, cancer, obesity, depression, and a healthier state of mind. Evidence from studies on the effects of regular physical activity and exercise on vasomotor and other menopausal symptoms is conflicting.

Cognitive decline is a complex process influenced by several variables, such as neuroinflammatory changes, which are now more widely acknowledged as contributing factors to age-related cognitive impairment.[5] Physical and mental health are two critical channels through which PA exerts its benefits on cognitive function.[6] PA is recommended as a promising strategy for cognitive decline intervention, and there are various cognitive responses to PA among women with varying parity statuses. Older adults who experience a decline in their physical and/or cognitive functions would become dependent on others, which in turn impacts their well-being.[7] Preservation of physical and cognitive functions is a key element in ensuring a good quality of life.

Agility is the ability to change the body's position efficiently and requires the integration of isolated movement skills using a combination of balance, coordination, speed, reflexes, strength, and endurance.[8] Ageing is a dynamic, progressive, physiological process accompanied by morphological and functional changes. Hence, individuals over 50 years of age may start to experience manifestations of imbalance and body instability. Moreover, the ageing process tends to reduce physical fitness (strength, endurance, agility, and flexibility) and results in difficulties in daily life activities and normal functioning of the elderly. Because of this process, the elderly are more prone to falls due to lack of agility, negligence towards the utilisation of assistive devices, and social stigma.

Increased physical activity levels may lessen menopausal symptoms.[9] Exercise has long been shown to be just as beneficial as aerobic exercise, meditation, and relaxation, causing them to lose weight, have more intense hot flashes, and have a lower chance of memory problems.

Investigating the relationship between PA and QoL (Quality of Life) may benefit medical professionals such as physicians, nurses, and physiotherapists in creating health-promoting plans and efficient measures to enhance postmenopausal women's quality of life and wellbeing.[10] Decline with age, functional fitness and PA are seen in older women,

affecting muscle strength, flexibility and stamina as a result of ageing. Health providers should encourage more older adults to engage in physical activity to improve, preserve, and regain their ability to receive assistance.

Postmenopausal women are at a greater risk of cognitive decline, reduced physical function, and poor quality of life due to age-related and hormonal changes. Although physical activity may positively influence these factors, few studies have simultaneously examined its association with cognitive function, agility, and QoL, particularly among Indian postmenopausal women.

Hence, there is a need to explore these relationships and provide evidence to promote healthy ageing.

Given the global increase in life expectancy and the growing number of working women of postmenopausal age, it is crucial to identify modifiable lifestyle factors that can help preserve cognitive abilities and physical agility, thereby promoting healthy ageing and reducing the burden of disability.

Objectives of the study:

1. To assess the correlation of physical activity with cognitive function in postmenopausal women.
2. To assess the correlation of physical activity with agility in postmenopausal women.
3. To assess the correlation of physical activity with quality of life in postmenopausal women.

MATERIALS AND METHODS

This pilot study was conducted among postmenopausal women aged ≥50 years living in the community in Southern Karnataka. Participants were recruited using convenience sampling. Women with at least 12 months of natural menopause who met the inclusion criteria were enrolled in this study. Women with neurological disorders, musculoskeletal conditions affecting mobility, severe cognitive impairment, or any condition that interfered with their participation were excluded.

After obtaining written informed consent, the participants were assessed for physical activity, cognitive function, agility, and quality of life using standardised outcome measures. Physical activity was assessed using the International Physical Activity Questionnaire–Short Form (IPAQ-SF), cognitive function using the Montreal Cognitive Assessment (MoCA), agility using the 8-Foot Up-and-Go Test, and quality of life using the Menopause-Specific Quality of Life Questionnaire (MENQOL).

Data were analysed using SPSS version 29.0 to determine the correlation between physical activity, cognitive function, agility, and quality of life among postmenopausal women.

RESULTS

Statistical analyses were performed using SPSS version 29.0. Descriptive statistics were expressed as mean± standard deviation (SD) and median for continuous variables, while categorical variables were presented as frequency and percentage. The relationships between the IPAQ, MoCA, 8-FUG test, and MENQOL were analysed using Karl Pearson's correlation coefficient (r). Statistical significance was set at $p < 0.05$.

The study included 16 postmenopausal women with a mean age of 52.88 ± 1.41 years (range: 51.00-55.00 years).

Physical activity was assessed using the IPAQ. 56.3% (n=9) of the participants belonged to the average physical activity category, while 43.8% (n=7) were categorised as having a high physical activity level. The mean IPAQ score was 2930.94 ± 1928.00.

Table 1: Descriptive Statistics of Age and Physical Activity Category among Post-menopausal Women

		Mean± SD/ f (%)
Age		52.88 ± 1.41
IPAQ Category	Average	9 (56.3%)
	High	7 (43.8%)

IPAQ (International Physical Activity Questionnaire)

The mean cognitive function MOCA total score of the postmenopausal women was 27.00 ± 1.21, with scores ranging from 25.00 to 30.00. The mean agility measured using the 8-foot up-and-go test was 7.16 ± 1.23 s, with values ranging from 5.60 to 10.40 s. Quality of life, the mean vasomotor domain score was 5.25 ± 1.23, the psychosocial domain score was 4.91 ± 1.16, the physical domain score was 5.91 ± 0.65, and the sexual domain score was 3.06 ± 0.69. The overall QoL mean score was 5.31 ± 0.73, with scores ranging from 3.13 to 5.89.

Table 2: Descriptive Statistics of Cognitive Function, Agility, and Quality of Life among Post-menopausal Women

		Minimum	Maximum	Mean	Std. Deviation
Cognitive function	MoCA Total	25.00	30.00	27.000	1.211
Agility	8ft Time sec	5.600	10.400	7.163	1.229
Quality of life	Vasomotor	2.66	7.00	5.248	1.226
	Psychosocial	1.85	6.28	4.906	1.156
	Physical	4.06	6.43	5.907	0.646
	Sexual	1.66	5.00	3.060	0.692
	Total	3.13	5.89	5.308	0.725

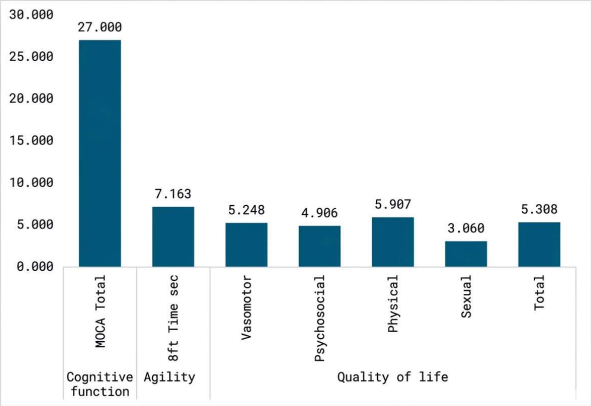


Figure 1: The Mean Scores of Cognitive Function, Agility, and Quality of Life among Post-menopausal Women

The correlation between physical activity (IPAQ Total MET) and cognitive function (MOCA total score) was very weak and positive (r = 0.032). However, the association was not statistically significant (p = 0.906) among postmenopausal women, indicating that physical activity was not significantly correlated with cognitive function in this study.

Table 3: Correlation of Physical Activity and Cognitive Function

		MOCA Total
IPAQ Total MET	r value	.032
	p value	.906
	N	16

IPAQ (International physical activity questionnaire), MET (Metabolic Equivalent of Task), MoCA (Montreal cognitive assessment)

There was a moderate positive correlation (r = 0.484) between physical activity (IPAQ Total MET) and agility (8-foot up-and-go time) among the post-menopausal women. However, this association was not statistically significant (p = 0.057) in the study sample, indicating that physical activity was not significantly correlated with agility.

Table 4: Correlation of Physical Activity and Agility

		8ft Time sec
IPAQ Total MET	r value	.484
	p value	.057
	N	16

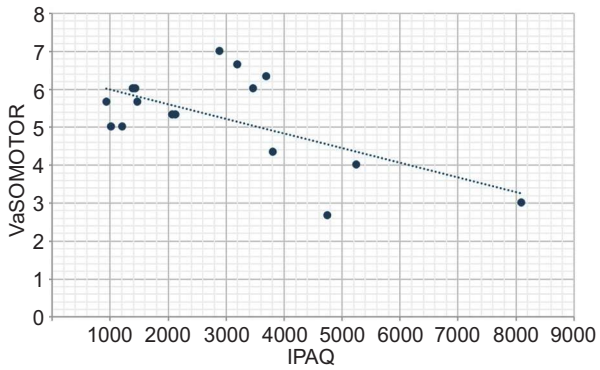
IPAQ (International physical activity questionnaire), 8ft Time sec (8 Foot- Up and Go test)

Physical activity (IPAQ Total MET) had a moderate negative and statistically significant correlation with the vasomotor domain of QoL (r = -0.604, p = 0.013), indicating that higher physical activity was associated with lower vasomotor symptom scores. A weak negative, non-significant correlation was observed in the psychosocial domain (r = -0.252, p = 0.346). Similarly, the physical domain demonstrated a weak negative, non-significant correlation (r = -0.252, p = 0.346). The sexual domain showed a moderate negative, non-significant correlation (r = -0.456, p = 0.076). The overall QoL score also exhibited a weak negative, non-significant correlation with physical activity (r = -0.309, p = 0.244).

Table 5: Correlation of Physical Activity and Quality of Life

		Vasomotor	Psychosocial	Physical	Sexual	Total
IPAQ Total MET	r value	-.604*	-.252	-.252	-.456	-.309
	p value	0.013*	.346	.346	.076	.244
	N	16	16	16	16	16

IPAQ (International physical activity questionnaire), MET (Metabolic Equivalent of Task)



International Physical Activity Questionnaire (IPAQ)

Figure 2: Scatter Plot Representing the Correlation of Physical Activity and Vasomotor Quality of Life

DISCUSSION

This pilot study examined the relationship between physical activity, cognitive function, agility, and quality of life among community-living postmenopausal women aged ≥ 50 years in Southern Karnataka.

The mean age of participants (52.88 ± 1.41 years) is consistent with reported menopause onset ages of approximately 51 years in industrialised settings and 43–49 years in developing regions.[3] Menopause represents an irreversible transition defined by 12 consecutive months without menstruation.[1] It is accompanied by a hormonal decline that predisposes women to physical, psychological, and cognitive changes.[2] In this study, 56.3% of participants showed average activity levels and 43.8% showed high activity levels, indicating a fairly active sample.

The weak, non-significant correlation between physical activity and cognitive function ($r = 0.032$, $p = 0.906$) may partly reflect a ceiling effect; the mean MoCA score of 27.00 ± 1.21 suggests largely preserved cognitive function among participants, which could have limited the ability to detect a meaningful association. The MoCA remains a well-validated and reliable screening tool for mild cognitive impairment.[28,29] This null finding contrasts with several larger investigations in the field.

Pokorski and Alberski reported a significant association between physical activity and cognitive function in postmenopausal women, emphasising the role of regular physical engagement in preserving neurocognitive health.[12] Similarly, Chen *et al*. identified that physical activity benefits cognitive function in postmenopausal women through both physical and mental health channels, with nutritional status and depression serving as chain mediators.[6] Chia *et al*. further demonstrated a positive association between physical activity and cognitive function in a multiethnic Asian older adult population, highlighting the relevance of these findings across diverse populations.[7]

Guerrero-González *et al*. compiled evidence positioning physical exercise as protective against cognitive decline, depression, and dementia during the menopausal transition, attributing this to anti-neuroinflammatory mechanisms.[5] De Sousa *et al*. likewise found physical and cognitive function to be significantly associated in postmenopausal women, proposing that functional capacity may serve as an indirect marker of cognitive health.[16]

Given the small sample size of 16 participants, this pilot design is the most plausible explanation for the absence of significant findings. A larger, adequately powered study is required to confirm or refute these associations.

A moderate, though not statistically significant, positive correlation was found between physical activity and agility, as measured by the 8-Foot Up-and-Go Test ($r = 0.484$, $p = 0.057$). This borderline result, combined with a moderate effect size, points to a clinically meaningful trend that a larger sample might confirm in future studies. The 8-Foot Up-and-Go Test is a validated, reliable measure of functional mobility and agility in older adults, useful for detecting both cognitive and physical decline.[31]

Wang *et al*. found that this test carries predictive value for early detection of cognitive decline among community-dwelling older women, underscoring its dual utility as both a physical and cognitive screening tool.[13] Rodrigues *et al*. identified muscle strength, agility, and fear of falling as significant predictors of fall risk in older adults, reinforcing the clinical importance of agility assessment in this population.[14]

Anderson *et al*., in a systematic review, concluded that physical activity may help prevent both physical and cognitive decline in postmenopausal women, lending biological

plausibility to the trend observed here.[17] Donat Tuna *et al*. showed that activity level meaningfully influences functional fitness, including agility, among older adults.[18] While Hallage *et al*. found that structured aerobic training improved functional fitness among elderly women.[19]

Latorre-Rojas *et al*. further emphasised functional fitness assessment, including agility, as a determinant of functional age in women aged 50 and above.[21] Galán-Arroyo *et al*. identified significant associations between agility, health-related quality of life, and depression among physically active older women, suggesting that agility is both a health outcome and a predictor of well-being.[20]

The significant moderate negative relationship between physical activity and vasomotor QoL ($r = -0.604$, $p = 0.013$) indicates that greater activity levels were associated with milder vasomotor symptom burden and improved vasomotor health, a pattern consistent with the existing literature. D'souza *et al*. found a significant relationship between physical activity and menopause-related quality of life, particularly regarding vasomotor symptom relief.[4] Daley *et al*. examined exercise as an intervention for vasomotor symptoms and noted its promise as a non-pharmacological option.[24]

Barati *et al*. identified physical activity as a key modifiable determinant of quality of life among postmenopausal women, with vasomotor health showing particular responsiveness to lifestyle changes.[9] Guna *et al*. reported a significant relationship between activity levels and quality of life among menopausal women, corroborating the present findings.[22] MENQOL, the instrument used here to assess menopause-specific quality of life, remains a validated and widely used tool spanning vasomotor, psychosocial, physical, and sexual domains.[32,33]

No significant correlations were found between physical activity and psychosocial ($r = -0.252$, $p = 0.346$), physical ($r = -0.252$, $p = 0.346$), sexual ($r = -0.456$, $p = 0.076$), or overall quality of life domains ($r = -0.309$, $p = 0.244$), which diverge from the findings of larger studies. Tsekoura *et al*., reported significant associations between physical activity and multiple quality-of-life domains in a cross-sectional study of postmenopausal women.[15] Felipe *et al*. found that varying intensities of physical activity significantly influenced overall quality of life, with higher-intensity activity yielding greater benefit.[15,23]

Dalal and Agarwal characterised postmenopausal syndrome as encompassing psychosocial and sexual dimensions, highlighting the multifactorial nature of quality of life in this population.[34] The moderate negative correlations observed here for the sexual domain ($r = -0.456$) and overall quality of life ($r = -0.309$) point to potentially meaningful trends that a larger sample could help confirm statistically. IPAQ-SF, used in this study to quantify activity levels, is a validated and reliable measure with well-established psychometric properties across diverse populations.[25-27,35]

The principal limitation of this study is its small convenience-based pilot sample ($n = 16$), which restricts statistical power and generalizability. Nonetheless, examining these correlations can help physiotherapists and allied health professionals develop evidence-based health promotion strategies for postmenopausal women. Larger, adequately powered cross-sectional and interventional studies are needed to comprehensively investigate these relationships within the Indian context, where such evidence remains limited.

CONCLUSION

This pilot study found that postmenopausal women with higher levels of physical activity reported better vasomotor-related QoL, although no significant association emerged with cognitive function, agility, or overall QoL. These findings suggest that physical activity may help ease vasomotor symptoms in postmenopausal women, while larger, adequately powered studies are necessary to clarify its relationship with cognitive function, agility, and other quality-of-life dimensions.

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Conflict of Interest: Nil

Visceral mobilization offers a promising manual therapeutic approach that may modulate both GBA function and CS processes, although the evidence base requires strengthening through high-quality studies. For physiotherapists, integrating the knowledge of these systems supports the comprehensive assessment and treatment of patients with complex chronic pain presentations, particularly those with visceral components.

By adopting holistic approaches that consider gut health, neural plasticity, and manual interventions, along with traditional musculoskeletal treatments, physiotherapists can enhance the outcomes of patients with conditions such as IBS, fibromyalgia, and chronic low back pain. Future research should focus on randomized controlled trials to validate these integrated approaches and elucidate the mechanisms by which VM influences the GBA and CS pathways, ultimately improving the management of complex pain syndromes.

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