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Research Article

Assessing Physical Activity And Effect Of Health Education Intervention On Physical Activity, Cognition, And Functional Outcomes In Urban And Rural Elderly In Chengalpattu District Of Tamil Nadu

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ABSTRACT

Background: Regular physical activity is crucial for maintaining health and functional independence among the elderly population. This study aimed to assess physical activity levels and the impact of an educational intervention on physical activity, cognitive function, activities of daily living (ADL), and quality of life among urban and rural elderly adults.

Material and Methods: A community-based intervention study was conducted from September 2023 to December 2023 among 100 elderly individuals (50 urban, 50 rural) aged ≥60 years in Kattankulathur block, India. Participants were assessed using structured questionnaire. Pre- and post-intervention assessments were conducted, and appropriate statistical analysis were performed.

Results: The intervention resulted in significant improvements in PASE scores, OPQOL scores, and MMSE scores in both urban and rural groups ($p<0.001$). While no significant change was noted in ADL scores among urban participants ($p=0.768$), the rural cohort demonstrated a marginally significant improvement ($p=0.05$). These findings suggest the intervention effectively enhanced physical activity levels, quality of life, and cognitive function, irrespective of residential setting. However, the impact on activities of daily living was more pronounced among rural older adults.

Conclusions: The health education intervention was effective in improving physical activity, quality of life, cognitive and function among elderly individuals.

Keywords: Elderly; health education; physical activity; quality of life

Introduction

By 2050, one out of every six people will be above the age of 65 (1).The aging of the population worldwide and in rural and isolated places exhibit comparable patterns (2) An increasing number of older individuals are permanently remaining in rural and remote locations, notwithstanding a notable demographic shift in recent decades regarding rural-to-urban migration (3).There are several common and particular issues that older residents of such communities face. It is harder to finance and provide comprehensive services like health and social infrastructure for small numbers of older people dispersed across broad areas in rural and remote places due to lower population densities and geographically separated inhabited areas (4). A cross-sectional study conducted in Malaysia discovered that older age, having family members with diabetes, and greater educational levels were associated with lower levels of physical activity and approximately 41.5% of older persons with type 2 diabetes mellitus engage in minimal physical activity.(5) The global population is undergoing a profound demographic shift, with a substantial increase in the proportion of older adults projected over the coming decades. By 2030, individuals aged 60 and above are expected to constitute a significant segment of the total global population (6). This aging trend underscores the pressing need to

address the health and well-being concerns of older adults, including their physical activity levels and quality of life.

Older adults often face a myriad of health challenges, such as chronic diseases, functional limitations, and mental health issues. Physical inactivity is highly prevalent among this population and is associated with an increased risk of chronic conditions like cardiovascular disease, diabetes, and dementia (7). Sedentary lifestyles contribute to declines in physical function, mobility, and overall quality of life in older populations (8). On the other hand, regular physical activity holds promise for enhancing health and quality of life among inactive older adults(9).

Despite these benefits, global trends indicate widespread physical inactivity among older adults, with lower activity levels being associated with higher mortality rates, particularly in East Asian populations. The Physical Activity Scale for the Elderly (PASE), developed by Washburn et al., (10) offers a reliable and validated tool for quantifying activity levels among seniors, encompassing leisure, household, and work-related activities.

While earlier health promotion efforts primarily focused on lowering mortality rates or illness risk, more recent research has highlighted the impact of cognitive function and degenerative diseases, such as osteoarthritis, on physical activity levels in older adults (11). In this study, we utilized the PASE scale to evaluate geriatric physical activity among rural and urban elderly.

Furthermore, recognizing the multifaceted nature of healthy aging, we implemented a multi domain health education intervention designed to improve physical activity, cognitive function , activity of daily living and quality of life with the aim of promoting active and healthy aging. This study aimed to contribute in the effective strategies for enhancing the well-being of older adults.

Methods

Study Design and Setting

A community based intervention study was conducted from September 2023 to December 2023 among elderly individuals residing in urban and rural areas of Kattankulathur block, after obtaining approval from the Institutional Ethics Committee.

Participants

Elderly adults aged 60 years or older, able to communicate effectively, free from co-morbidities and residing at their current place for at least one year were eligible for inclusion. Exclusion criteria were with co-morbidities, being bedridden, unwilling to participate, or unavailable after three attempted visits.

Sampling

Using purposive sampling technique, households in the field practice area of selected urban and rural health care services were enlisted, total 100 elderly participants who met the inclusion criteria were recruited randomly for the study.

Intervention

The intervention comprised two sets of 12 interactive health education sessions. Weekly sessions were conducted, involving mild physical exercise, yoga, meditation, and cognitive training on inductive reasoning, verbal memory, and visual search/identification tasks, facilitated by trained physiotherapists.

Details of intervention:

Initially the selected participants were given information about the place and timing of the intervention program. The health education programs involved lectures, audio-visual sessions, interactive sessions and activities with various health related topics.

Physical exercise:

Physical exercise training given by qualified physiotherapist, Yoga (Yoga poses like bujangasana, tadasana, vrksasana, vajrasana, siddhasana) Relaxation techniques and Breathing exercise (pranayamas) meditation training was given. Hand-outs on elderly exercises, yoga, meditation were given for reinforcement.

Cognitive training on memory (verbal memory):

Handouts with words, pictures were distributed as well as dictated to the participants and asked to memorize them, after a brief period of 10 minutes they were asked to recollect it correctly.

Cognitive training on reasoning (inductive reasoning)

Printed materials on problem solving exercises were given and narrated statements or stories and asked to reason out the facts or conclusion according to their perception

Cognitive training on speed of processing (visual search And identification)

Speed of processing training was given by printed materials on various pictures and emotions and asked to identify and name it.

Outcome Measures

Physical Activity Scale for the Elderly (PASE)

The PASE is a widely used 12-item self-report questionnaire that assesses physical activity levels in older adults over the preceding seven days. Activities across leisure, household, and occupational domains are evaluated, with scoring based on duration and empirically derived weights for energy expenditure. PASE scores may range from zero to 400 or more. Higher score represents high physical activity.

Mini-Mental State Examination (MMSE)

The MMSE is an 11-question screening tool that evaluates cognitive performance across five domains: orientation, registration, attention and calculation, recall, and language. Scores range from 0 to 30, with ≥23 indicating cognitive impairment.

Activities of Daily Living (ADL)

The ADL scale comprises six items assessing the adequacy of performance in basic self-care tasks: bathing, dressing, toileting, transferring, continence, and eating. Scores range from 0 (complete dependence) to 6 (full function).

Older People's Quality of Life (OPQOL)

The 13-item OPQOL questionnaire was used to evaluate quality of life. Items are scored from 1 (strongly agree) to 5 (strongly disagree), with higher scores indicating better quality of life after reverse coding positive items.

Data Collection

Data were collected through face-to-face interviews after obtaining verbal and written informed consent from all participants. Pre-intervention assessments of physical activity, cognitive function, activities of daily living, and quality of life were conducted, followed by post-intervention evaluations to assess improvements.

Statistical Analysis

Data was entered in excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 25. Frequencies, percentage and Mean, Standard deviation was done. Paired t test analysis was done to evaluate the improvement before and after the intervention.

Results:

Table-1 Characteristics of study participants:

Characteristics	Urban (N=50) (%)	Rural (N=50) (%)	Total (N=100)
Age			
60-64	20 (40)	22 (44)	42
65-69	20 (40)	14 (28)	34
70-74	7 (14)	9 (18)	16
≥75	3 (6)	5 (10)	8
Sex			
Male	22 (44)	26 (52)	48
Female	28 (56)	24 (48)	52
Education			
Illiterate	15 (30)	26 (52)	41
Primary school	20 (40)	15 (30)	35
High school	7 (14)	4 (8)	11
Higher secondary school	5 (10)	3 (6)	8
Graduates	3 (6)	2 (4)	5
Marital Status			
Married	22 (44)	40 (80)	62
Unmarried	2 (4)	1 (2)	3
Widow	14 (28)	6 (12)	20
Widower	7 (14)	4 (8)	11
Divorced	3 (6)	2 (4)	5
Religion			
Hindu	26 (52)	33 (66)	59
Christian	16 (32)	13 (26)	29
Muslim	8 (16)	4 (8)	12
Living Arrangements			

Spouse	20 (40)	22 (44)	42
Children and spouse	19 (38)	22 (44)	41
Alone	8 (16)	5 (10)	13
Others	3 (6)	1 (2)	4
Source of Income			
Own	17 (34)	27 (54)	44
Pension	14 (28)	4 (8)	18
Others	19 (38)	17 (34)	36
Economic Dependency	26 (52)	32 (64)	58
Independent	24 (48)	18 (36)	42
Dependent			
Old People Quality of Life	4 (8)	1 (2)	5
Very Good	7(14)	5 (10)	12
Good	10(20)	14 (28)	24
Alright	21(42)	15 (30)	36
Bad	8(16)	13 (26)	21
Very Bad			

Table-2 Mean Score of Urban Physical Activity Scale for the Elderly (PASE Component)

PASE Component	Sample mean(n=100)	PASE Weight	Total PASE Score
Leisure Activity			
Walk outside home	0.21h/d	20	4.2
Light sports and recreational activities	0. 17h/d	21	3.57
Moderate sports and recreational activities	0.18h/d	23	4.14
Strenuous sports and recreational activities	0.10 h/d	23	2.3
Muscle strength and endurance activity	0.08 h/d	30	2.4
Housework activity			
Light housework		25	21.4
Heavy housework	85.6%	25	12.45
Home-repair	49.8%	30	6.15
Lawn work/yard care	20.5%	36	11.3
Outdoor gardening	31.4%	20	3.66
Caring for another person	18.3% 29.5%	35	10.3
Work related activity			
Paid voluntary work	0.18 h/d	21	3.78
TOTAL			85.65

Table-3 Mean Score of Rural Physical Activity Scale for the Elderly (PASE Component)

PASE Component	Sample mean(n=100)	PASE Weight	Contribution to total PASE Score
Leisure Activity			
Walk outside home	0.24 h/d	20	4.8
Light sports and recreational activities	0. 08h/d	21	1.68
Moderate sports and recreational activities	0.02 h/d	23	0.46
Strenuous sports and recreational activities	0.10 h/d	23	2.3
Muscle strength and endurance activity	0.04 h/d	30	1.2
Housework activity			
Light housework	90.4%	25	22.6
Heavy housework	56.7%	25	14.1
Home-repair	10.5%	30	3.15
Lawn work/yard care	30.4%	36	10.9
Outdoor gardening	13.8%	20	2.76
Caring for another person	34.6%	35	12.1
Work related activity			
Paid voluntary work	0.06h/d	21	1.26
Total			77.31

Table: 4 Changes in the outcome variables before and after intervention among the elderly

Variables	Urban			Rural		
	Before	**After**	**P-Value**	**Before**	**After**	**P-Value**
PASE SCORE	85.65±52.8	145±38.9	>0.001	77.31±48.6	152±23.8	>0.001
OLD PEOPLE QUALITY OF LIFE SCORE	38.8± 15.1	49.7± 12.6	>0.001	33.2± 10.4	44.1± 15.3	>0.001
ADL SCORE	21.92± 18.5	27± 20.13	≥ 0.768	24± 17.83	38± 16.4	≥ 0.05
MMSE SCORE	20±2.4	25±2.3	>0.001	19±1.5	24±2.3	>0.001

Table 1 represent socio demographic details , among the study population 48% are males and 52% were females with mean age of 64.5 years. Most of the elderly were married (62%). Majority of the elderly were

illiterate (41%). Hindus (59%) were predominant in the study population. Most of the elderly were residing with their children (41%) followed by with spouse (42%) and living alone (13%).source of income (44%), economic dependency (58%) and quality of life of elderly was reported as alright (36%) and bad (21%)

Table 2 and 3 displays the contribution of each questionnaire item to the overall PASE mean score as determined by the product of the sample mean and activity weight. PASE scores observed in this sample of older persons ranged from 0 to 360 .The mean sample score for urban was 85.65, with a standard deviation of 52.8 , the median score was 78 and the mean sample score for rural was 77.31, with a standard deviation of 48.6. This represents less physical activity among both urban and rural elderly.

Table 4 shows the effects of health education intervention on physical activity, quality of life, activities of daily living, and cognitive function among urban and rural older adults . In the urban group, significant improvements were observed in the Physical Activity Scale for the Elderly (PASE) score, Old People Quality of Life score, and Mini-Mental State Examination (MMSE) score after the intervention compared to baseline ($p<0.001$). However, no significant change was noted in the Activities of Daily Living (ADL) score ($p=0.768$). Similarly, in the rural cohort, the intervention resulted in significant increases in PASE score, Old People Quality of Life score, and MMSE score ($p<0.001$), along with a marginally significant improvement in ADL score ($p=0.05$). These findings suggest that the intervention was effective in enhancing physical activity levels, quality of life, and cognitive function among older adults, regardless of their urban or rural residence. However, the impact on activities of daily living was more pronounced in the rural population compared to their urban counterparts.

Discussion

The present study demonstrates the efficacy of the intervention in improving physical activity levels, quality of life, and cognitive function among older adults, in urban or rural residence. Less physical activity was observed among rural elderly compared to urban elderly participants, our results are aligned with previous findings (12) which states efforts should be made to increase physical activity among rural elderly. Sedentary behavior accelerates the aging process and increases the risk of illness or incapacity (13,14). Leveille et al.(15) state that physical activity (PA) is essential for preventing impairment in older adults, and that older adults who lead sedentary lifestyles are twice as likely to have infirmity. Hence our study framed set of intervention to improve the physical activity levels, quality of life, and cognitive function among older adults.

Notably, the intervention resulted in significant improvements in PASE, quality of life, and MMSE scores in both urban and rural groups. These outcomes underscore the potential of the intervention to enhance physical, mental, and cognitive well-being in older adults across diverse geographic settings. These findings are consistent with previous research highlighting the improvement in quality of life with similar interventions for older populations (16). Study by mahindru A et.al (17) states that increased physical activity is known to have numerous health benefits, including better cardiovascular health, improved mental well-being, and enhanced cognitive function. A study by Luo Y et al (18) also showed that elderly who involved in productive activities showed less cognitive decline when compared to others who had less activities.

Interestingly, the rural elderly demonstrated a marginally significant improvement in ADL scores, while no significant change was observed in the urban group. This discrepancy may be attributed to differences in baseline functional status, lifestyle factors, or other socioeconomic determinants between the two populations. Previous research has suggested that rural older adults may face unique challenges in terms of access to healthcare and supportive resources, which could impact their functional abilities (19). The intervention may have addressed some of these challenges, leading to improved ADL performance in the rural group.

Our findings shows there is positive relationship between physical activity and healthy ageing, these results are consistent with recent meta-analysis and systematic review of the relationship between physical activity and good aging revealed that physical activity could promote healthy aging by 39% (20). Hence it is strongly advised that future research should concentrate on a more standardized intervention approaches for promoting healthy ageing among healthy individual and individual with comorbidities.

Limitation: It is short study done to evaluate the effect of physical activity intervention to promote healthy ageing with limited sample size. Participants without any co morbidity was purposely selected for the study hence generalizability can be comprised. Future studies with larger sample are needed for strengthening the existing literature and should focus on identifying the specific components of the intervention that contribute to the observed benefits and explore potential effect modifiers or mediators. Additionally, longitudinal studies are warranted to assess the long-term sustainability of the intervention effects and their impact on healthcare utilization and cost-effectiveness.

Conclusion:

Findings of our study support the implementation of the intervention as a promising approach to enhance physical, mental, and cognitive well-being among older adults in both urban and rural settings. Further high-

quality research is needed to strengthen the evidence and inform the development of targeted, cost-effective interventions for promoting healthy aging across diverse populations. Promoting the quality of life among elderly can be eased by integrating physical activity intervention with community organization

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