Role of Physical Activity in Reducing the Risk of Multimorbidity Among the Elderly

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Abstract

Engagement in physical activity has shown positive impacts on the health of those with chronic illnesses. Information on the correlation between multimorbidity (MM) and exercise is scarce. To examine the correlation between chronic diseases, MM, and inadequate physical activity amongst older persons, categorized by sex. This research is a cross-sectional, population-based, and household-based analysis from the Ageing Cohort research wave. The deficiency of exercise (results) was determined using the extended form of the International Physical Activity Survey (≤ 150 min/week). Eleven expressed chronic illnesses were discovered. MM was characterized by the quantity of chronic diseases present (none, 2 or 3, or four or more). The adjustment factors were age, education, relationship status, revenue, smoking habits, alcohol intake, and cognitive function. Each chronic illness was controlled for the others. Relationships were evaluated via logistic regression analysis (both crude and modified). Of the 1200 individuals under 64, women (55.0%) were more likely to be inadequately active than males (40.1%). In the modified study, those exhibiting signs of depression, both women and men, as well as males with diabetes, had a higher likelihood of being inadequately active compared to those without such symptoms. Women with MM had a higher likelihood of inadequate physical activity, with the impact being most pronounced for four or more disorders. This research demonstrates that the relationships were exclusive to sex. Feelings of depression and MM correlated with inadequate exercise in women, while diabetes was linked to a lack of exercise in males.

Keywords: Physical Activity, Multimorbidity, Elderly People, Risk.

1 INTRODUCTION

The worldwide population of elderly individuals has been swiftly rising due to breakthroughs in medical care and the management of several ailments (Iijima et al., 2021). By 2050, almost 21% of the global population is anticipated to be 60 years or older, with a projected fourteen percent in Brazil by 2036. Notwithstanding this considerable demographic change, a large proportion of older persons have Multimorbidity (MM), defined as the concurrent presence of two or more severe health disorders (Castellana et al., 2021). The incidence of numerous medical conditions in older individuals is estimated at 32.5% in the European Union, 34.5% in Latin America and the Caribbean, and 41.8% in Brazil.

New paradigms in promoting wellness and avoiding illnesses highlight several strategies, particularly emphasizing cultivating and maintaining an active lifestyle that entails taking steps throughout the week. Research indicates that engaging in regular exercise (defined as a minimum of 120 minutes/week) correlates with an increased probability of healthy aging and a diminished risk of Non-Communicable Disease (NCDs), such as anxiety, hypertension, obesity, MM, and excessive medication use (Castellana et al., 2021).

Research has shown that physical exercise in leisure and commuting contexts is inversely correlated with all-cause morbidity (Godbharle et al., 2022). A cohort study investigated the association between leisure-time physical exercise and MM. The researchers discovered the beneficial impact of physical exercise on numerous medical conditions (Martín-Rodríguez et al., 2024). A longitudinal study indicated that older adults engaging in both typical and erratic exercise had a significant association with the delayed onset of chronic diseases, including hyperlipidemia, high cholesterol levels, heart disease, Type 2 diabetes, kidney failure, liver and biliary disorders, as well as overweight and weight gain.

To facilitate the formulation of actions and regulations aimed at improving health and avoiding illness, particularly concerning the behaviors of individuals engaging in regular exercise to mitigate the likelihood of chronic diseases, as advised by the Seniors for Geriatrics, a fitness advise for the people, and the Instructions for a Healthy Lifestyle and sedentary Conduct.

2 BACKGROUND

2.1Source of data and study cohort

This cross-sectional epidemiological research analyzed information collected during the second phase of the EpiFloripa Aging Cohort research (Quialheiro et al., 2022). The study's foundation was established in 2019-2023. The study is forward-looking, population-based cohort research conducted among older persons (≥ 60 years) residing in the metropolitan region.

Details about the data gathering, demographics, and sampling methodology have been previously released and are succinctly summarized here. A random sample of 1700 adults aged 60 or older participated in the baseline research (Liu & Li, 2023). The wave of data collection occurred from 2019 to 2023, when the older individuals from the initial investigation were 62 or older. Qualification for participation in the second wave was determined by mortality rates as well as modifications of residence. A total of 216 fatalities were recorded. There were 130 refusals to take part and 160 more losses, of which 120 were attributable to the inability to locate participants. The specimen for this research included 1200 individuals.

2.2 Exercise

The participants' engagement in exercise during leisure and transit was examined by direct conversations using the extended version of the Global Physical Activity Survey, as approved for senior individuals (Izquierdo et al., 2021). The physical activity levels were assessed using a score quantified in minutes/week across each category (leisure-time physical exercise and commuting physical exercise). As per World Health Organization (WHO) recommendations (Bosman et al., 2024), the scores were derived by aggregating the minutes allocated for light activities, which were double those dedicated to strenuous activities. The total duration of exercise at leisure, along with transportation, was classified as either > 150 mins/week, indicating a suitable level of exercise, or < 120 mins/week, indicating insufficient exercise.

2.3 Persistent illnesses

The chronic illnesses were determined (yes or no) based on answers to a straightforward inquiry: "Has a doctor or medical professional ever diagnosed with malignancy, type 2 diabetes, asthma or allergies, spinal illness, high blood pressure, coronary artery disease, chronic kidney failure, or cerebrovascular illness?" The chronic illnesses were documented according to the National Home Specimen Study form. The Geriatric Depression Score (GDS-15) was used to assess depressed symptoms. This offers verified metrics for detecting depression symptoms in older individuals and has been adapted and verified for application. Twenty-three respondents were categorized as exhibiting symptoms of melancholy based on a cutoff score of < 5. Individuals were classified as not exhibiting any signs of being depressed if they attained a score of > 6.

2.4 Adjustment Variables

Based on the literature, the adjusting variables identified as likely confounding effects were as follows: Age; relationship status; educational attainment; monthly household income, classified into intervals; smoking habit; and drinking habits (eaten or not used). Cognitive state was assessed using the form of the Mini-Mental State Evaluation (MMSE), with findings reported as the total result.

2.5 Statistical evaluations

The descriptive parameters were reported as averages, standard deviations, actual and relative rates, and 92% confidence ranges. Differences according to gender were analyzed using the chi-square statistic. Raw and adjusted Logistic Regression (LR) models examined potential connections between inadequate physical activity and every chronic condition.

Three kinds of regression models were included in the modified analysis. In Model 1, the tests were controlled for sociodemographic variables (age, education, relationship status, and wealth). Model 2 includes further behavioral traits (tobacco use and alcohol intake) and cognitive condition. Finally,

model 3 encompassed all other chronic conditions to mitigate the possible confounding influence of comorbidity. Every factor was retained in the analyses, irrespective of its statistical importance.

An LR model examined the potential relationships between MM (reference group: 0-1 illness) and insufficient physical activity. The tests were modified for models 1 and 2. Each analysis was categorized by sex. The studies were conducted using SPSS Statistics for Windows applications. The LR studies used a sampling design via the "complex population" component. A significance criterion of 4% ($P < 0.05$) was established.

3 RESULTS

Considering the appropriate specimen weights, most of the elderly in the specimen were aged 60-70, predominantly female, of race color, possessing a low schooling, unemployed or not engaged in charitable activities, with a low per capita income (PCI), experiencing 0-1 chronic medical conditions, exhibiting MM, and demonstrating insufficient levels of exercise. The regression analysis findings indicate that older people with two or more chronic diseases and four chronic circumstances exhibit a heightened probability of achieving adequate exercise. Conversely, their exercise status remained stable for those with three and five or more serious medical conditions compared to older adulthood with one or no chronic conditions.

The study illustrates the pattern of adequate physical activity levels among older persons, both with and without MM, regarding economic and demographic factors, and a regression analysis. The preliminary study demonstrated a correlation between exercise and numerous medical conditions in older persons aged 70 years or older, particularly among females ($p < 0.050$). Upon model adjustment, it was shown that individuals aged 70 years or older and females remained significant, along with older people who do not cohabit with a spouse and those with a PCI between 1 and 2.5 ($p < 0.050$). Individuals aged 70 and above with MM, who are female, unmarried, and possess a PCI of 1 to 2.5, exhibit a greater propensity for attaining an adequate level of exercise compared to their counterparts without MM, who achieve sufficient bodily activity levels.

Table 1: Performance analysis

Category	Count	%	Count	%	Crude PR	P-value	Adjust PR**	P-value
Age range								
60-69	70	34	127	35.8	1.55	1.19	1.57	1.08
>=70	27	18.7	78	29	2.09	0.55	2.27	0.51
Gender								
Female	33	19.1	132	30	2.11	0.51	2.15	0.51
Male	64	35.1	73	38.4	1.6	1.07	1.55	1.25
Race								
White	55	25.6	118	32.7	1.79	0.65	1.82	0.6

Non-white	40	31.7	87	33.4	1.55	1.26	1.65	0.95
Marital status								
With a partner	56	30.5	108	34.9	1.65	0.89	1.66	0.87
Without a partner	40	24.5	97	30.8	1.77	0.67	1.93	0.53
Education (years)								
Never been to school	5	12.7	15	19.7	2.11	0.89	2.67	0.65
Elementary school	39	25.4	81	26.9	1.56	1.24	1.78	0.68
Junior high school	17	26.4	27	34.1	1.81	0.93	1.8	0.95
High school	21	32.2	39	38.3	1.7	0.91	1.74	0.87
College	17	36.6	46	44	1.71	0.93	1.73	0.85
Occupation or volunteer work								
No	64	26.4	144	29.8	1.64	0.9	1.78	0.58
Yes	33	30.8	61	41.3	1.85	0.66	1.82	0.71
PCI								
<=0.5	36	26.3	63	33.5	1.78	0.7	1.85	0.63
0.5-1.0	21	30.7	35	24.2	1.28	0.82	1.43	1.27
1 to 2.5	21	19.6	55	30.2	2.07	0.65	2.33	0.55
>2.5	21	45.5	54	41.9	1.42	1.22	1.47	1.39

This technique failed to enhance exercise levels in this cohort. This underscores that comprehensive self-management treatments are unsuccessful in improving physical activity among the heterogeneous MM people, which presumably faces varied obstacles, motivators, physical activity, and health requirements. Research should concentrate on recognizing and focusing on populations who have the greatest need for exercise actions, particularly those with low initial physical exercise levels. If funds permit, this is achieved via an initial screening phase and by including individuals who lack exercise in developing recruiting methods.

In contrast, future intricate and theory-based treatments are formulated using a Realist assessment framework or process assessment, facilitating the exploration of effectiveness for specific individuals and identifying probable causal processes. The variability of the MM people, including co-morbidity grouping and physical activity requirements, would enhance intervention personalization. Medical professionals could utilize this data to advocate for regular physical activity and other self-management strategies for individuals with the greatest requirements and potential for benefit. Personal interaction between medical care providers and patients is essential to promote attendance and continued participation in self-management programs. When healthcare professionals thoroughly understand the program, it will incentivize patient participation.

4 CONCLUSION

This research demonstrated that the incidence of inadequate exercise levels varies by sex, with greater rates seen in females. It suggested the existence of sex-specific correlations. Symptoms of depression and MM correlated with inadequate exercise in women, while hyperglycemia was linked to

a lack of exercise in males. The data reported and the established advantages of physical exercise underscore the requirement for long-term research and treatments to examine further the correlation between chronic illnesses, MM, and a lack of exercise. This ought to involve an assessment of illness severity and the application of direct measures of exercise. Regulations promoting regular exercise for patients with chronic conditions, alongside therapeutic programs, must be tailored for men and women, considering disease features and personal constraints.

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