Functional capacity, risk of falling and chronic pain in older adults during the COVID-19 pandemic: a telemonitoring study

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OBJECTIVE: To compare active and sedentary older adults regarding functional capacity, risk of falling, and chronic pain in a population assisted by telemonitoring during the pandemic lockdown. METHODS: This analytical, cross-sectional study included 104 older adults who were telemonitored during the COVID-19 lockdown by a team from a Brazilian Unified Health System outpatient clinic specializing in geriatrics and gerontology. A structured interview was used to collect data. Following normality testing with the Shapiro-Wilk test, Student’s t-test was used for group comparisons. Associations were analyzed using the χ² test, and the odds ratio was calculated in a 2x2 table of sedentarism and falls in the last six months. The data were analyzed using SPSS version 26.0, with p ≤ 0.05 considered significant. RESULTS: The 57 active older adults had a lower rate of continuous medication use (24.84 vs 27.62%), fewer falls (50 vs 32.11%), less pain (12.31 vs 3.83%), and greater independence in basic activities of daily living (44.39 vs 26.46%). CONCLUSIONS: Older adults who were physically active in the midst of social distancing had better functional capacity in basic activities of daily living, fewer falls, and less pain than their sedentary peers. Independence in instrumental activities of daily living did not differ significantly between the groups. KEYWORDS: exercise; older adults; social distancing; COVID-19; telemonitoring.
INTRODUCTION

After the World Health Organization (WHO) defined COVID-19 as a pandemic last March 2020, health authorities determined a series of infection prevention and control measures to mitigate its impact, particularly in vulnerable populations. Those measures, including standard precautions, with particular emphasis on hand hygiene, respiratory etiquette, the use of face masks, and social distancing, may be challenging to older adults, restricting physical and social activities.1-3

Social distancing may be a risk factor for sedentary behavior in community-dwelling older adults, whose chronic conditions can be aggravated. Sedentarism is associated with cardiometabolic and mental health problems, decreased functional capacity, and increased pain and risk of falling.2-4,7

Knowing that exercise can positively affect physical and psychological health, fall risk, and chronic diseases in confined older adults, a number of studies have sought to provide exercise options through alternative strategies in order to overcome the adherence problems and sedentary behavior induced by social distancing measures.6,8

Resolution 516 (March 20, 2020) of the Federal Council of Physical and Occupational Therapy (Coffito), sanctioned telemonitoring, which consists of remote monitoring of patients who were previously assisted in person, for physical and occupational therapists. Now that this strategy has been made official and encouraged, it can be offered through a variety of technologies and platforms,3,9-11 including over the telephone. It is a cost-effective, convenient, and simple method of providing health information, education, and psychosocial support to older people at home.10

The reported benefits of telemonitoring include cost and convenience, since it precludes travel, reduces loneliness due to social isolation, supports an exchange of information, improves healthcare access, reduces costs, and improves public and individual health through personalized care.9,12

Thus, the objective of this study was to compare functional capacity, fall risk, and chronic pain in active and sedentary community-dwelling older adults during the COVID-19 pandemic who were assisted through telemonitoring. We hypothesized that there would be a lower prevalence of pain and falls and greater functional capacity in active older adults than their sedentary peers.

METHODS

This study was approved by the Health Sciences Teaching and Research Foundation Research Ethics Committee (FEPECS/SES/DF: number 148142/202; CAAE 41526720.5.0000.5553). The ethics committee waived the informed consent requirement for this study.

Study type

This was an analytical, cross-sectional study with a quantitative approach.

Sample

The convenience sample consisted of geriatric physical therapy patients who received regular care at the Taguatinga Polyclinic (a Brazilian Unified Health System facility in Taguatinga, Federal District) before COVID-19 was officially declared a pandemic (March 20, 2020, Decree 10.308).

A total of 104 community-dwelling older adults of either sex, aged at least 60 years, were included. They had been in regular care in the physical therapy sector in the first quarter of 2020 but their care was suspended due to the pandemic and agreed to participate in a telemonitoring intervention strategy. All participants had to be able to answer questions independently during a phone call and/or have a caregiver to help them.

Older adults whose phone number no longer existed, who did not answer three consecutive call attempts approximately one day apart, were excluded. For this study, patients previously diagnosed with neurological sequelae (cerebrovascular accident, Parkinson’s disease, or Alzheimer’s disease) were excluded.

Variables and measurement instruments

The study variables represented the participants’ clinical and physical functioning characteristics. Data were collected through a structured interview prepared by the researchers. To facilitate the respondents’ comprehension, dichotomous questions were used. Each question is explained below.

Social distancing is a preventive measure in which people must keep a minimum distance of 1.5 meters from each other and avoid crowding,14 which limits the number of people in regular contact with a person, as well as relationship quality.15 This variable was operationalized through self-reporting with the question: “Have you maintained social distancing and avoided crowding?”

Exercise is defined as a subcategory of physical activity that is planned, structured, repetitive and intentional, aiming to improve or maintain physical fitness, physical performance, or health.16 This variable was also operationalized through the question: “Have you been getting any exercise?” The answer was considered affirmative when ≥ 150 minutes of activity per week was reported.17 The respondents were then asked to clarify what types of exercise they performed.
One exercise possibility was the Hope protocol, an intervention including progressive home exercises aimed at frail older adults, which is the strategy used in our physical therapy service.\textsuperscript{18,19} It mainly consists of strengthening exercises for the muscle groups needed for functional abilities. This was the most common exercise type reported (34%) and is identified in Table 1 as “other exercise”.

Data on the participants’ clinical variables and physical functioning were collected using a form created for the telemonitoring program, and the questions were addressed to the participant and/or the caregiver. Clinical data were investigated through self-report, including diagnoses of pre-existing chronic diseases, the number of continuously used medications, and pain complaints, defined as an unpleasant emotional experience related to real or potential tissue damage.\textsuperscript{20} If the question “Do you have any pain?” was answered in the affirmative, the location of the pain was then asked.

The participants were asked about falls, defined as an accidental event that results in a drop from a higher to a lower position, being unable to correct one’s trajectory in a timely manner or support oneself on the ground. Falls due to sudden paralysis, loss of consciousness, epileptic seizure, or overwhelming external force were excluded.\textsuperscript{21} This variable was operationalized through the question: “Have you suffered any falls in the last six months?” Those who responded positively were asked about complications resulting from the event.

Physical and functional data were investigated to determine the level of independence in activities of daily living according to the Katz index. Questions were asked for each of the six domains. The participants were classified as independent when they reported needing no help for any activity, mild/moderately dependent when needing help for one to three activities, and dependent when needing help for four to six activities.\textsuperscript{22}

The Lawton-Brody scale was used as a reference for independence in instrumental activities of daily living (IADLs),\textsuperscript{23} with questions covering 8 domains. The participants were classified as independent, assisted, or dependent.

The participants were characterized sociodemographically through age, sex, education, and marital status data.

### General procedures

#### Data analysis and statistical methods

The sample size was calculated considering a confidence interval of 95%, a significance level of 0.01, and a sampling power of 99%, using the 38.77% fall rate of older adults in the Federal District as a reference.\textsuperscript{13} Considering the 82.11%

<table>
<thead>
<tr>
<th>Table 1. Characterization, comparison, and association of demographic data according to active (n = 57) and sedentary (n = 47) older adults.</th>
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</thead>
<tbody>
<tr>
<td>Physically active</td>
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<tr>
<td>Yes (57)</td>
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<tr>
<td>Mean/Standard deviation</td>
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<tr>
<td>Age</td>
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<tr>
<td>Sex</td>
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<td>male</td>
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<td>Years of education</td>
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<td>9–11</td>
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<td>&gt; 11</td>
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<tr>
<td>Marital status</td>
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<tr>
<td>widowed</td>
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<tr>
<td>divorced</td>
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<tr>
<td>How are you?</td>
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<td>well</td>
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*Comparison with Student’s t-test; association according to the $\chi^2$ test; $p \leq 0.05$ considered significant.*
fall rate found in the pilot study, the G coefficient was 0.47, resulting in a sample of 53 participants. Using normality data, one-way ANOVA was performed in G*Power version 3.2 (Universitat Kiel, Germany). Although the sample size was calculated at 58 based on a 10% loss, we chose to use more participants.

The statistical analysis initially relied on descriptive data, with means and standard deviations for scalar variables and frequencies and percentages for categorical variables. Following normality testing with the Shapiro-Wilk test, Student’s t-test was used for group comparisons. Associations were analyzed using the χ² test, and the odds ratio was calculated in a 2x2 table of sedentarism and falls in the last six months. The data were analyzed using SPSS version 26.0, with p ≤ 0.05 considered significant.

RESULTS

During the study period, 144 older adults who were receiving physical therapy in person prior to the pandemic and who met the inclusion criteria were evaluated for eligibility. Of this group, 104 agreed to participate and were included in the analyses. Based on their self-reported exercise level, 57 were classified as active and 47 were classified as sedentary (Figure 1).

Most of the participants were women, had a low education level, were widowed, and were in good self-reported health (Table 2). There were no significant differences between the groups regarding age, sex, education level, marital status, or self-reported health, demonstrating the homogeneity of the groups.

Among the factors associated with exercise during the pandemic, the active group had a lower rate of continuous medication use (24.84 vs 27.62%), fewer falls (50 vs 32.11%), less pain (12.31 vs 3.83%), and were more independent in activities of daily living (44.39 vs 26.46%). There was no significant difference in the need for caregivers or independence in instrumental activities of daily living between the groups (Table 1).

DISCUSSION

This study compared functional capacity, fall risk, and chronic pain in a population of socially isolated active and sedentary older adults assisted by telemonitoring, given that social isolation has been shown to be a risk factor for sedentary behavior, which is associated with falls, decreased functional capacity, and pain.2,4-7

We hypothesized that there would be a lower prevalence of pain and falls and greater functional capacity among the active participants than their sedentary peers. Our findings corroborated this hypothesis and confirmed previous studies,5,24,25 which concluded that the lifestyle of older adults should not be totally interrupted or changed during social distancing and that exercising can effectively mitigate the harmful effects of living in restricted environments. An active lifestyle helps protect this age group against physical deconditioning, frailty, sarcopenia, and fall risk, maintaining health, reducing pain, and improving independence in activities of daily living.

However, although regular exercises is correlated with good autonomy levels in old age and contributes to the performance of activities of daily living and instrumental activities of daily living,25 this study found no significant difference between the groups in independence in instrumental activities of daily living. It is possible that participants who were partially or totally dependent did not exercise due to the need to leave home and go to environments that could be crowded with people, which is unfeasible during the pandemic. As a result, caregivers and family members may have sought care and avoided exposing the older adults.

Our findings suggest that exercise is an important tool during this period of social distancing. Although social distancing measures to contain the effects of the COVID-19 pandemic have affected older adults’ ability to exercise, an active lifestyle can still be maintained during this period with exercise programs that can be carried out at home.

In this study, the active participants reported walking in their backyards (21.73%) and/or performing the Hope protocol (characterized as “other” – 34%) during lockdown.18,19 When
Older patients undergoing physical therapy prior to the pandemic must continue receiving specialized care. To meet this need, telemonitoring is recommended as an appropriate strategy for preventing functional decline. Accordingly, a previous study confirmed that telemonitoring, having been primarily designed to help patients with comorbid health conditions, can be a critical component of keeping health services functioning and safe. In addition, it offers a means of empowering older adults, helping deal with the consequences of social distancing and promoting active aging at home.

The present study compared physical functioning in a population of socially isolated active and sedentary older adults assisted by telemonitoring, using simple questions and tools validated for older adults. The sample size was determined by a priori calculation. However, the use of self-reported data, in addition to the possibility that the caregiver might have insufficient information to verify the participant's current...
condition, could be considered study limitations. Additionally, intergroup heterogeneity regarding underlying diseases may have influenced the findings. Another limitation was a lack of comparison with similar studies, which suggests the need for further research in the area.

Despite its limitations, the intervention format used in this study is relevant for health professionals since it may help prevent the physical consequences of social restrictions during the COVID-19 pandemic. Understanding the importance of telemonitoring services and the possibility of their continuance beyond the pandemic, we support their integration into the arsenal of health professionals. We also recommend further practical research that specifically targets the needs of older adults, given their high physiological and physical vulnerability, to help improve their health and quality of life during social distancing.

CONCLUSION

Older adults who were physically active during the COVID-19 pandemic had better functional capacity in activities of daily living, fewer falls, and less pain than their sedentary peers. However, no significant differences were found between the groups for independence in instrumental activities of daily living.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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AUTHORS’ CONTRIBUTIONS

RA: Conceptualization, data curation, funding acquisition, investigation, methodology, resources, software, visualization, writing – original draft, writing – review & editing.
NM: Conceptualization, formal analysis, funding acquisition, investigation, methodology, project administration, resources, supervision, validation, visualization, writing – original draft, writing – review & editing.
TM: Conceptualization, funding acquisition, resources. IM: Conceptualization, data curation, funding acquisition, resources. SS: Conceptualization, funding acquisition, resources. HP: Conceptualization, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – original draft, writing – review & editing.

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