OBJECTIVE: Evaluating the fine motor skills (M1) degree in a group of independent elders, checking its possible association with the weekly practice of physical activities. METHODS: 139 independent elders of both genders, aged 60 and older, who responded to a survey about their weekly practice of physical activities and then, later on were subjected to M1 tests according to EMTI, which final scores determine each individual's M1. The elderly were categorized into two groups: 60-70 years-old and above 70 years-old. RESULTS: the female gender was predominant in the sample. Most of the elders (46.56%) showed a M1 Mean Normal, followed by Inferior levels (29.50%) and Superior levels (23.74%). About 6.5% of the elders do not practice any physical activity, 5% practice it once a week, 35.5% more than two times per week. It could be observed that those practicing physical activity at least three times a week have better score on the M1 test (Mann-Whitney Test; p = 0.039). On the other hand, the group older than 70 years had a worse performance (Mann-Whitney Test, p = 0.001). CONCLUSION: The M1 Normal Medium was the score achieved with the highest percentage in the two age groups analyzed, being the group older than 70 years the one that presented worse performance. In addition, sedentary elderly or those who report having physical activity only once a week also had the worst test results. 

KEYWORDS: aged; motor skills; motor activity; health of the elderly; health of institutionalized elderly.
INTRODUCTION

The increase in life expectancy of Brazilians and a low birth rate make Brazil move quickly into an increasingly older demographic profile. With aging, there is a natural reduction tendency in the roles of elderly individuals in their environment, due to the risk of incapacity in motor activity and the worsening in the quality of life. However, this longevity will only be valuable if there is quality of life, having been verified that constant physical activity is one of the factors that promote it.3

The aging process, attenuated by regular physical activity, varies for each individual and does not necessarily occur in parallel to the elderly’s chronological age. A process can affect the loss of several body functions such as motor activity, which is related to changes in the peripheral nervous system, occurring mostly after 60 years of age, considering age as the most important factor in the decline of motor performance.4 In addition, there is decreased muscle density, which makes motor coordination more fragile and unstable, resulting in partial or total loss of independence for performing day-to-day tasks, especially for those with a sedentary lifestyle. Thus, there will be limited mobility, risk of falls, and changes in finer movements.

Isolation and lack of physical activity are factors that accelerate this process, which may vary due to diverse internal and/or external factors, age and sex. However, regular physical activity is an important factor to significantly improve the quality of life of this population, but when this frequency is twice a week, there is great improvement in several aspects, including in mental health, vitality and perception of pain.5

Fine motor skill (M1), which is related to motor coordination, is one of the six motor areas in the human body. It comprehends the visual–manual coordination, which operates in activities requiring precision and dexterity, such as oral and dental prostheses hygiene, which may determine difficulties in its efficiency when committed. The Motor Scale for the Elderly (EMTI) comes from individually applied motor tests which evaluate the motor development of the elderly and allows quantifying and assessing the possible motor harm that are impeding their daily activities, such as in the case of M1.

Therefore, this study aims to evaluate the degree of M1 in a group of independent elderly by checking the possible association with their weekly frequency of physical activity.

METHODS

This was a transversal study, approved by the Certificate of Presentation for Ethical Consideration: 14863013.6.0000.5346. It was conducted by collecting data for the years 2013 and 2014, for three days each year, during practice activities of the Dentistry course at the Federal University of Santa Maria (UFSM), with project members of the Integrated Center for Studies and Support of Elders (NIEATI) — Santa Maria, Rio Grande do Sul, Brazil.

It counted on the voluntary participation of 200 elderly, all above 60 years of age and participants of elderly group activities, after the work was explained and a consent form was signed. Each participant was interviewed, and only those considered independent in performing daily activities were included in this study, and those with noticeable sensory, mental and neurological changes, that hindered the application of motor tests, were excluded. The participants were further categorized into two age groups of 60 to 70 years of age and above 70 years of age, such as other studies.

The data related to the demographic questionnaire and the M1 tests were collected by six pairs of trained examiners, all of whom were undergraduate students of the Dentistry course in UFSM. They applied the tests according to EMTI, comprising 10 levels from 2-11, such as “throw a ball with one hand” (Level 9), “catching a ball with one hand” (Level 11), “making a little ball of paper with one hand” (Level 7), among other tests, all in a set time. Each senior starts at level 5 and, once having been successful, advances to a higher level and so on, up to 11 (maximum), or ends in the highest test level they can accomplish. If not successful at the beginning of the test (level 5), one goes back to a lower level and so on, until reaching level 2 (minimum) or ending at the lowest test level they accomplish. Each test successfully performed equals 12 points; when separately testing to evaluate the two highest members and only one member is successful, this test will equal to 6 points. If the test is not performed, it equals to 0 points. The total sum of the points made at the end of the tests determines its M1 as follows: Very Superior (130 points or more), Superior (120-129 points), Normal High (110-119 points), Normal Medium (90-109 points) Normal Low (80-89 points), Inferior (70-79 points) and Very Inferior (69 points or less).

A difference between the M1 scores in the categories of weekly frequency of physical activity was verified. The elderly were grouped into two age groups (60-70 years of age and above 70 years of age) and into 3 groups as for their physical activity performance (does not performs regular activities; performs activities up to twice a week; performs activities at least three times per week).

The Statistical Package for Social Sciences software (SPSS version 17.0; SPSS Inc., Chicago, Ill) was used through a descriptive statistical analysis of the scores obtained by M1.
testing with each individual. With the Kolmogorov–Smirnov test, the non-normality of the data was observed, and then the Mann–Whitney test was applied to check for differences between the scores of M¹ in the categories of age and weekly frequency of physical activity. The significance level was set at 5%. The sample size was calculated with 80% power, a confidence level of 95%, and a maximum prevalence of 0.5 adherence to the study, with an error of 5%, resulting in a calculation of a minimum sample size of 133 individuals. The final sample was composed of 139 individuals of both genders, who responded to a structured questionnaire and participated on a subsequent implementation of M¹ tests, according to the EMTI.

**RESULTS**

It was observed that the majority of the sample (89%) was female, and in relation to age, most part of the sample (58%) was between 60 and 70 years of age while another 42% of the group was older than 70 years old.

Table 1 shows that most of the sample has M¹ scores around the Mean Normal rate for the two categories related to age, and that about 23% of the elderly from 60 to 70 years of age and 19% of the ones older than 70 score as Superior or Very Superior. In the Inferior and Very Inferior categories, the percentage was 13% in the 60 to 70 years of age group and 35% in the group older than 70.

From Table 2, one can see that, for the smallest part of the sample, approximately 12% of the elderly do not practice physical activities or just do it once a week, and about 88% of them practice physical activities at least twice a week. Of the total, 22% rank as Very Inferior or Inferior M¹, and the same percentage was rated as Superior or Very Superior. One can observe that most the elderly (56%) have M¹ ranging from Normal Low to Normal High.

In relation to age categories (60-70 years of age and above 70 years of age), it was observed that those ranked higher in the age scale had significantly lower scores achieved in the M¹ tests (Mann-Whitney Test; p = 0.001). Regardless the relation between the crude score and the practice of physical activities (categorized up to twice a week and more than twice a week), senior citizens who practice physical activities more than twice a week have a significantly better M¹ performance (Mann-Whitney Test; p = 0.039).

<table>
<thead>
<tr>
<th>M¹ (EMTI)</th>
<th>Age</th>
<th>60 - 70 years old</th>
<th>&gt; 70 years old</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Very Superior (130 points or more)</td>
<td>1 (1)</td>
<td>3 (5)</td>
<td>4 (3)</td>
<td></td>
</tr>
<tr>
<td>Superior (120 to 129 points)</td>
<td>18 (22)</td>
<td>8 (14)</td>
<td>26 (19)</td>
<td></td>
</tr>
<tr>
<td>Normal High (110 to 119 points)</td>
<td>3 (4)</td>
<td>0 (0)</td>
<td>3 (2)</td>
<td></td>
</tr>
<tr>
<td>Mean Normal (90 to 109 points)</td>
<td>43 (53)</td>
<td>22 (38)</td>
<td>65 (47)</td>
<td></td>
</tr>
<tr>
<td>Normal Low (80 to 89 points)</td>
<td>5 (6)</td>
<td>5 (9)</td>
<td>10 (7)</td>
<td></td>
</tr>
<tr>
<td>Inferior (70 to 79 points)</td>
<td>2 (3)</td>
<td>4 (7)</td>
<td>6 (4)</td>
<td></td>
</tr>
<tr>
<td>Very Inferior (up to 69 points)</td>
<td>9 (11)</td>
<td>16 (27)</td>
<td>25 (18)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>81 (100)</td>
<td>58 (100)</td>
<td>139 (100)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of physical activity/week</th>
<th>Sample</th>
<th>Fine Motor Skills Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Sedentary/1x</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>2x</td>
<td>74</td>
<td>53</td>
</tr>
<tr>
<td>3x or more</td>
<td>49</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>139</td>
<td>100</td>
</tr>
</tbody>
</table>
DISCUSSION

This study had two statistically significant findings: aged people who performed physical activity at most once a week, and the group of elderly over 70 years of age presented worse M1 score. Although they have not used the EMTI scale, there are researches18,20 who observed the loss of motor skills related to aging, which is evidenced in the sample of this study by a statistical test (Mann-Whitney test, with significance level of 5% p = 0.001), in which the more aged scored the lower the score in M1 tests. However, it is interesting to note that, while one test assessed the fine motor skills of 112 elderly women engaged in physical activity (twice a week),17 the other20 evaluated questionnaires about functional capacity answered by 182 elderly, of which approximately 75% were sedentary. Even with a much lower percentage of sedentary people in this study (6.47%), the same pattern of motor decline was obtained with respect to aging. Noting that the practice of physical exercise once a week in the short term does not improve the elder’s quality of life, the percentage of 5.04% of people who are physically active once a week may be included, totaling 11.51% of sedentary elders in this study.

The division of our sample into two age groups was performed for comparison and/or characterization of the age groups as for the M1 level, similarly to other researches.2,17 A given study that used the EMTI in 202 elderly of both genders, without specifying whether they were sedentary or not, found Normal High M1 in the group aged between 60 and 70 years of age, and Normal Medium M1 in the group aged over 70. The present study found a similar behavior in the reduction of the M1 when comparing the two age groups, although they presented differences in the group between 60 and 70 years of age, which reached Normal Medium M1. This difference can be explained because aging presents variations between individuals and does not necessarily occur in parallel to the elderly’s chronological age.4 When compared to the same study,2 considering the total sample of elderly and regardless of age, our results corroborate with the ones observed in these, with Normal Average M1.

When evaluating 142 elderly people between 70 and 79 years old, also using EMTI, another study obtained Normal Medium M1, corroborating our results in the group aged over 70 years old.17 In a research with 73 independent seniors living in Long-term Care Facilities, considered independents, and with both genders in their sample, an average of M1 equal to Inferior was obtained.21 This low M1, which contrasts with the findings of this study, may be explained probably by the sample characteristics of each study. One suggestion for this difference is that the elderly who live in those institutions live in a limited space and with fewer daily demands, performing less complex daily physical activities, which leads to less motor stimulation.

The human biologic aging is a relentless and irreversible process,22 and is characterized by several consequences, such as the morphofunctional involution that affects all physiological systems, generating greater vulnerability of the organism to external and internal aggressions.23 In addition to these biological changes, there is an increase in the prevalence of chronic diseases, which originate from the accumulation of damage throughout life, mainly due to the interaction between genetic factors with unhealthy habits, such as sedentarism. An inappropriate lifestyle leads to an increase in metabolic inefficiency, which contributes significantly to the breakdown of body homeostasis and increases the process of cellular senescence.24 There is evidence that the aging process has multifactorial causes and depends on genetic programming and changes occurring at cellular-molecular level.24 The hereditary factors would account for 30 to 50% of the aging process, while the lifestyle (personal and environmental factors), for the rest.25

As for the gender, this study showed a much higher percentage of women (around 89%), which highlights the female prevalence in elderly in relation to men, featuring the so-called Phenomenon of Aging Feminization.26 Other studies also demonstrate this predominance in their samples, above 68%2,21,27 and above 80%,3,37 Due to the small number of elderly males (11.51%), the data is not considered for comparison, but instead the total sample is used. Probably due to the female predominance in 2008,18 one opted for using the female elderly sample only.

The limitations of this study are confined to the information provided by the elderly through the initial questionnaire applied before the M1 tests. Regarding their visual condition, for example, due to the elderly’s own negligence, he or she could wear glasses with an incorrect degree or not use it when it was indicated so, which could make it difficult to perform the tests. Besides, the elderly could indicate that they perform more physical activities than they actually do in their daily lives.

CONCLUSION

It was concluded that the Normal Medium M1 was the classification achieved with the highest percentage in the two age groups analyzed, being in the group older than 70 years of age the ones that presented worse performance, mainly for the sedentary elderly or those who affirmed to perform physical activity at most once a week in all the sample.

CONFLICT OF INTERESTS

The authors report no conflict of interests.
The water exercise improves health-related quality of life of frail older people at day service facility. Qual Life Res. 2007;16(10):1577-85.


