GDLAM’S protocol of functional autonomy evaluation

Estélio Henrique Martin Dantas,
PROCIMH – Universidade Castelo Branco / RJ - Brasil
LABIMH – UCB / RJ
Grupo de Desenvolvimento Latino-Americano para Maturidade - GDLAM
Bolsista de Produtividade em Pesquisa – CNPq
estelio@cabrase.com.br

Rodrigo Gomes de Souza Vale
PROCIMH – Universidade Castelo Branco / RJ - Brasil
LABIMH – UCB / RJ
Grupo de Desenvolvimento Latino-Americano para Maturidade – GDLAM
vale@redelagos.com.br

Abstract: The present study had the aim to establish a functional autonomy evaluation protocol throughout tests related with the realization of the activities of daily living (ADL). The sample was formed of 275 old women (\( \bar{C} = 66.33 \pm 4.69 \) years old), voluntaries and independent on the ADL. Tests of functional autonomy evaluation protocol by Latin-American Development to the Maturity Group (GDLAM’S Protocol) were used. GDLAM’S Protocol was formed for C10m, LPS, LPDV and LCLC tests. The statistical analysis made by Quartiles established the autonomy GDLAM index (IG). The IG showed scores classified on poor (+28.54), regular (28.54-25.25), good (25.24-22.18) and very good (-22.18). The study admitted the level of \( p<0.05 \) for statistic significance.

Keywords: functional autonomy, old, ADL

Correspondence to:

Submitted: November / 2003 Accepted: December / 2003

Copyright© 2004 por Colégio Brasileiro de Atividade Física, Saúde e Esporte
Life expectancy is increasing and aging population is occurring in almost all countries of the world, mainly in developing countries (IBGE, 2000). And what is wanted for be human is that it is independent in their daily activities and their decisions, that means, to live longer with quality and autonomy.

The process of aging varies widely between people and is influenced by both the lifestyle as by genetic factors (NIEMAN, 1999).

Here, the operational autonomy, or also known as functional capacity, is one of the most important concepts in relation to health, fitness and quality of life.

To study these concepts, a group of researchers of the Laboratory of Human Motricity Biosciences of the Castelo Branco University (LABIMH), formed by teachers and students of the Master’s Degree course on this institution, founded the Group of Latin American Development for the Maturity (GDLAM). This is characterized as an Organization of Civil Society in the Public Interest (OSCIP) legally constituted and protocolsed with registration No. 11624, 11/05/2004.

According to GDLAM, autonomy is defined in three ways: autonomy of action-referring to the notion of independence physics; autonomy of will - referring to the possibility of self-determination and autonomy of thoughts, which allows the judgment of any individual situation. It can be concluded that autonomy can not be defined in only one aspect, a single angle or perspective, but in a holistic context (Figure 1). On the other hand, the same group defines independence as the training tasks without help, whether of people, devices or systems (GDLAM, 2004).

Therefore, autonomy is linked to the decline in the ability to perform activities of daily life (AVD), and the gradual reduction of muscle functions, and can be, as Posner et al. (1995), a major loss with advancing age.

Recent polls indicate that the elderly can benefit from exercises not only increasing the strength and muscle strength, but also the balance and mobility. This can reduce the risk of falls and injuries, improving operational autonomy (ACSM, 2003; FLECK; FIGUEIRA JÚNIOR, 2003; FRONTERA; BIGARD, 2002; MATSUDO, 2002).

For the ACSM (2003), the muscle ability may make it possible to complete the activities of daily life with lesser effort and extend the functional independence by allowing living the last years in a self-sufficient and worthy way.

Thus, this study aimed to standardize a protocol for the evaluation of functional autonomy, called Protocol GDLAM through a battery of tests related to the implementation of the activities of daily life (AVD) in elderly women.

**MATERIALS AND METHODS**

**Sample**

The sample was made up of older volunteer women’s, apparently healthy, from social groups of the elderly, residents in the Região dos Lagos, in the Norte Fluminense region and...
West Zone of the State of Rio de Janeiro and Maceió, in the state of Alagoas.

The volunteer passed by a medical evaluation and signed the term of participation consent, in accordance with Resolution 196/96 of the National Council of Health. The study had its project taken before the search and approved by the Committee of Ethics in Research involving Human Beings the Castelo Branco University, RJ.

As a criterion for inclusion, individuals of the sample should be female, have 60 years of age or over, be physically able to perform a battery of tests selected for the evaluation of functional autonomy, and be independent in the performance of daily physical activities.

It was considered an exclusion criteria for any type of acute or chronic condition that could jeopardize or that become a factor of impediment to the realization of the tests.

**Procedures**

The tests were used to evaluate the protocol of operational autonomy of the Group of Latin American Development for the Maturity (GDLAM), made to walk 10m (C10m), up from the sitting position (LPS), lifting, decubitus position of the ventral (LPDV) and up to the chair and walk around by the house (LCLC). These tests are described below:

- Walking 10 meters (C10m) - the purpose of this test is to evaluate the speed that the individual takes to go the distance of 10 meters (SIPILÄ et al., 1996) (Figures 2 and 3).
Lifting from the sitting position (LPS) - the test aims to assess the functional capacity of the lower end and consists of: the individual, based on the sitting position in a chair without arm support, and the seat at a distance from the ground of 50 cm, raises up and takes a seat five times, consecutively (GURALNIK et al., 1994, 1995; 2000) (Figures 4 and 5).

Lift from the ventral decubitus position (LPDV) - the purpose of this test is to assess the ability of the individual to get up the floor. The test consists of: from the starting position in ventral decubitus, with arms along the body, the command of “now”, the individual must get up, leaving the position as soon as possible (Alexander et al., 1997) (Figure 6 and 7).

Lifting the chair and walk by the house (LCLC) - the objective is to assess the ability of the elderly in their agility and balance in life situations. With a chair fixed on the ground, should be demarked two cones diagonally to the chair, at a distance of four meters behind and three meters for the right and left sides of the same. The individual begins the test seated in the chair, with his feet off the floor, and with the sign “already,” he gets up, goes to the right, moves around the cone, returns to the chair, seat down, take both feet off the ground. Without hesitating, does the same move to the left. Immediately, realizes again the same course, to right and left, this way making the entire journey and circulating each cone twice, in the shortest time possible (ANDREOTTI; OKUMA, 1999) (Figures 8 and 9).

The times of these tests were assessed in seconds. The data were analyzed using descriptive statistics (Mean, Standard Deviation, Quartos) through the program “SPSS 10.0 for Windows,” to establish a standard for the classification and a general index of autonomy (index GDLAM-IG), as times achieved for the testing. The study acknowledged the level of $p < 0.05$ for statistical significance.

The IG was calculated by a process of standardization between the four tests of autonomy, to estimate a value in scores. This calculation was prepared by the proposed formula below:

$$IG = \frac{[(C10m + LPS + LPDV) \times 2] + LCLC}{3}$$

Where:

- $C10m$, $LPS$, $LPDV$, and $LCLC$ = time in seconds.
- $IG$ = GDLAM indices in scores.

**INSTRUMENTS**

As tools for assessment of the tests were adopted: a stopwatch (Cásio, Malaysia), a measure tape (Sanny, Brazil), a mattress and a chair with 50 cm of height from the seat to the ground.

**RESULTS**

The descriptive results of the sample as to the physical characteristics of the age and body mass index (BMI) are below, in table 1. Observing table 1, it was found that the sample is found in the age group of elderly (BRAZIL, 1999), but does not follow a normal distribution on the variable age. The average BMI of the group presented a searchable index of classification considered overweight, according to the World Health Organization (WHO).

In table 2 are the results of the distribution of normal by the method of Kolmogorov-Smirnov. Checking table 2, is noted that $C10m$, $LPS$, $LCLC$ and $FC$ had a near normal distribution. The test LPDV did not positioned the same way; a fact that does not de uncharacterizes data as a whole.

In table 3 are the results describing the protocol GDLAM. Analyzing table 3, it was observed that the test LPDV was the fastest to be executed by the sample, while the LCLC was the longest.
The average was the best measure of central tendency for the variables C10m, LCLC and IG, as the coefficient of variation (CV) was less than 20%. The values of the medians were coming to the values of the medium. The standard deviations are presented in a satisfactory manner.

In Table 4 are the results of the tests classified in the times achieved by the sample.

Observing table 4, it was found that this classification can be a parameter for assessing the autonomy of the protocol GDLAM, and be used as a standard reference for many studies in this area of research.

In Table 5 are given ratings of the assessment of the autonomy, through the protocol GDLAM, obtained through quarters.

Analyzing table 5, it was found that the categorization of the times achieved by the sample, made by the statistical quarter procedure, enabled classification into categories for each test individually, and standardization in scores of the IG of autonomy, both at: weak, regular, good and very good. For the applicability of this classification, it is recommended to use the average for C10m, LCLC and IG, and the median for the test LPS and LPDV as the results for the coefficient of variation-CV (table 3).

**DISCUSSION**

In Picture 1 are exposed the results of studies on the operational autonomy, to the activities of daily life (AVD).

Classifying the results of the studies presented in Table 1, according to table 5, it was found that for the C10m test, surveys of Valley (2004), in the control group, and Pernambuco et al. (2003) showed that the times achieved were regarded as weak, while work on Geraldes (2000), Valley et al. (2003 a, 2003b, 2004) and Varejão et al. (2004) obtained classified times as very good. In other studies, the results were in intermediate standings.

Differences on these times may be justified by the type of intervention proposed for each sample. But the times achieved are considered satisfactory for an old man crossing a street safely.

In the LPS test, the group that did not undergo the intervention study of Valley (2004), the group that has been evaluated at the beginning of an experimental treatment (PERNAMBUCO et al., 2004).

**Table 1 - Characteristics of the sample (n = 337)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Average</th>
<th>s</th>
<th>Median</th>
<th>CV</th>
<th>Standart error</th>
<th>a3</th>
<th>a4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>66.33</td>
<td>4.69</td>
<td>66.0</td>
<td>7.07%</td>
<td>0.30</td>
<td>0.81</td>
<td>1.13</td>
</tr>
<tr>
<td>IMC</td>
<td>26.01</td>
<td>4.42</td>
<td>25.54</td>
<td>16.98%</td>
<td>0.28</td>
<td>0.44</td>
<td>-0.05</td>
</tr>
</tbody>
</table>

S = standard deviation; CV = coefficient of variation; a3 = asymmetry; a4 = curtose; BMI = body mass index.

**Table 2 - Results of the normality test verification**

<table>
<thead>
<tr>
<th>Tests</th>
<th>n</th>
<th>Z Statistic</th>
<th>p-value</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10m</td>
<td>337</td>
<td>1.253</td>
<td>0.087</td>
<td>Normal</td>
</tr>
<tr>
<td>LPS</td>
<td>337</td>
<td>1.003</td>
<td>0.267</td>
<td>Normal</td>
</tr>
<tr>
<td>LPDV</td>
<td>313</td>
<td>2.650</td>
<td>0.000</td>
<td>Not normal</td>
</tr>
<tr>
<td>LCLC</td>
<td>92</td>
<td>0.798</td>
<td>0.548</td>
<td>Normal</td>
</tr>
<tr>
<td>IG</td>
<td>92</td>
<td>0.801</td>
<td>0.542</td>
<td>Normal</td>
</tr>
</tbody>
</table>

C10m = walk 10 meters; LPS = raise from the sitting position; LPDV = raise from the position of ventral decubitus; LCLC = lift chair and walk by the house; IG = GDLAM index in scores. P < 0.05.

**Table 3 - Results of the tests of the GDLAM protocol**

<table>
<thead>
<tr>
<th>Tests</th>
<th>C10m</th>
<th>LPS</th>
<th>LPDV</th>
<th>LCLC</th>
<th>IG</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>337</td>
<td>337</td>
<td>313</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>Average</td>
<td>6.45</td>
<td>9.77</td>
<td>3.78</td>
<td>39.26</td>
<td>25.73</td>
</tr>
<tr>
<td>Standart deviation</td>
<td>1.04</td>
<td>2.44</td>
<td>1.70</td>
<td>5.53</td>
<td>4.46</td>
</tr>
<tr>
<td>Median</td>
<td>6.34</td>
<td>9.55</td>
<td>3.30</td>
<td>38.69</td>
<td>25.22</td>
</tr>
<tr>
<td>CV</td>
<td>16.16%</td>
<td>24.97%</td>
<td>45.03%</td>
<td>14.09%</td>
<td>17.32%</td>
</tr>
<tr>
<td>Standart error</td>
<td>0.06</td>
<td>0.13</td>
<td>0.10</td>
<td>0.58</td>
<td>0.46</td>
</tr>
<tr>
<td>Minimum</td>
<td>4.03</td>
<td>4.89</td>
<td>1.64</td>
<td>30.10</td>
<td>19.02</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.84</td>
<td>17.71</td>
<td>13.33</td>
<td>58.72</td>
<td>38.23</td>
</tr>
<tr>
<td>Asymmetry a4</td>
<td>0.76</td>
<td>0.05</td>
<td>1.91</td>
<td>0.60</td>
<td>0.66</td>
</tr>
<tr>
<td>Curtose a3</td>
<td>1.00</td>
<td>0.00</td>
<td>4.89</td>
<td>0.55</td>
<td>0.02</td>
</tr>
</tbody>
</table>

C10m = walk 10 meters; LPS = raise from the sitting position; LPDV = raise from the position of ventral decubitus; LCLC = lift from the chair and walk by the house; IG = GDLAM index in scores. Test times were measured in seconds.
2003) and the group’s study of Geraldes (2000) had times that are located under the classification: weak. Findings of studies Baptista et al. (2003), Baptista (2004), Valley et al. (2003 -) and Vale (2004) showed that the execution times of testing are on level of classification: very good. The other results of the other surveys were distributed in other levels of classification of the Standard Protocol GDLAM. The time marked on this test can generate a sense of ease or difficulty that the elderly executants can demonstrate to lift themselves from a chair, which is a very frequent movement in daily life.

In the LPDV test, only Valley’s research (2003b) presented the results at a level of classification: very good. This may be related to the training of force that was used in the treatment trial. Other studies have shown other classifications. It is important to underline that in the study of Geraldes (2000), this test was used in the initial position of decubitus dorsal, different from other studies. This fact provides an increase in the time of implementation, since the elderly individual, initially, turns the body to the position of ventral decubitus, and then get up. This test represents the movement to lift itself from the floor or a bed.

Notice that the LCLC test was less used in the submitted studies. But it is a test that assesses the agility and balance of the elderly executants, becoming thus an important tool for assessing autonomy. This test was the longest of all, to be executed. No study showed a very good level of classification. It is easy to see the need of evaluation of it’s applicability in most polls. However, interventions that demanded a strength work achieved better results (VALE, 2004).

<p>| Table 4 - Classification of the times of the tests in quarters |</p>
<table>
<thead>
<tr>
<th>Tests</th>
<th>1st Quarter</th>
<th>2nd Quarter</th>
<th>3rd Quarter</th>
<th>4th Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10m</td>
<td>&gt; 7.09</td>
<td>7.09 – 6.34</td>
<td>6.33 – 5.71</td>
<td>&lt; 5.71</td>
</tr>
<tr>
<td>LPS</td>
<td>&gt; 11.19</td>
<td>11.19 – 9.55</td>
<td>9.54 – 7.89</td>
<td>&lt; 7.89</td>
</tr>
<tr>
<td>LPDV</td>
<td>&gt; 4.40</td>
<td>4.40 – 3.30</td>
<td>3.29 – 2.63</td>
<td>&lt; 2.63</td>
</tr>
<tr>
<td>LCLC</td>
<td>&gt; 43.00</td>
<td>43.00 – 38.69</td>
<td>38.68 – 34.78</td>
<td>&lt; 34.78</td>
</tr>
</tbody>
</table>

*C10m = walk 10 meters; LPS = raise from the sitting position; LPDV = raise from the position of ventral decubitus; LCLC = lift from the chair and walk by the house; IG = GDLAM index in scores.*

<p>| Table 5 - Standard of Evaluation of the Functional Autonomy of the GDLAM Protocol |</p>
<table>
<thead>
<tr>
<th>Test classification</th>
<th>C10m (sec)</th>
<th>LPS (sec)</th>
<th>LPDV (sec)</th>
<th>LCLC (sec)</th>
<th>IG (scores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week</td>
<td>+ 7.09</td>
<td>+ 11.19</td>
<td>+ 4.40</td>
<td>+ 43.00</td>
<td>+ 28.54</td>
</tr>
<tr>
<td>Regular</td>
<td>7.09 – 6.34</td>
<td>11.19 – 9.55</td>
<td>4.40 – 3.30</td>
<td>43.00 – 38.69</td>
<td>28.54 – 25.25</td>
</tr>
<tr>
<td>Very good</td>
<td>- 5.71</td>
<td>- 7.89</td>
<td>- 2.63</td>
<td>- 34.78</td>
<td>- 22.18</td>
</tr>
</tbody>
</table>

*C10m = walk 10 meters; LPS = raise from the sitting position; LPDV = raise from the position of ventral decubitus; LCLC = lift chair and walk by the house. Average = time (seconds). *

*The test was conducted in dorsal decubitus. Time in seconds.*
In general, when looking at Table 1, it's noted that the older sedentary subjects (PERNAMBUCO et al., 2003; VALE, 2004) achieved times that are situated at a level of classification: weak, on the Standard GDLAM Protocol for all the tests performed. This indicates that the elderly who remain physically inactive throughout life should suffer the effects of aging with greater impact, however, those who remain physically active tend to prolong the functional independence and quality of life.

Considering that the operational autonomy is linked to the activities of daily life (AVD), the general index (GI) was idealized to represent the level of this variable in the elderly. Due to the nature of the movement and its relation to daily life, all the tests seem to allow an overview of the elder.

As the results presented and the methodology applied, the present study suggests the creation of one more test for the evaluation of functional autonomy, which is linked to the movements of upper members. It points out the test of taking off and dressing shirts (VTC), where the time to completion of the same will be marked in seconds (Figures 10, 11, 12, 13 and 14). The lower the time of execution, the better the result. The individual should be standing with arms along the body and a T-shirt in one of the hands. At the sign of “already,” he should wear the shirts and, immediately, withdraw it, returning to the starting position. This test is intended to measure the agility and coordination of the upper members.

It is believed that with the inclusion of the VTC, the pattern of Protocol GDLAM of functional autonomy will be more complete in its overall assessment. That shows the attempt to establish a test that seeks to assess a movement which tends to make an achievement with the difficulty of aging, and that fits in AVD.

**CONCLUSION**

According to the findings of this research, the IG can be used as a parameter for assessing the functional autonomy for the realization of the AVD. Similarly, the study indicates that the pattern of Protocol GDLAM can be applied as a reference for future investigations, and to enter the VTC to investigate whether new standards of reference of autonomy.

**Acknowledgments**

Thanks to the Masters Teachers of the line research “Physical Activity, Autonomy and Quality of Life of the Elderly” of PROCIMH - UCB / RJ, Jani Aragon, Lilliany Lamb, Márcio Baptista, Carlos Pernambuco, Fatima Amorim, Amândio Geraldes and Ronaldo Varejão, who kindly gave the data for their Master’s theses, for the preparation of this study.

**REFERENCES**


PERNAMBUCO, Carlos S. Comparação de um programa de shiatsu terapia e de um programa de flexionamento dinâmico na flexibilidade, na autonomia e qualidade de vida do idoso. 2004, 177 f. Dissertação (Mestrado em Ciência da Motricidade Humana), Universidade Castelo Branco - UCB. Rio de Janeiro.


