The purpose of this study was to investigate the effect of a program of resistance training for eight weeks in the handgrip strength of the elderly.

Methodology
This research is characterized as pre-experimental (THOMAS, NELSON 2002). The initial sample consisted of 40 sedentary elderly volunteers, female, aged between 50 and 80 years. All the sample were volunteers and were living in an independent manner in their daily lives. The inclusion criteria were: individuals who did not train in gym and were registered in the project of physical activities for older adults, in the physical education department of Faculty Guairacá. All volunteers were informed about the research and signed the Statement of Free and Informed Consent Term. It was asked to the entire sample to maintain their routine activities of everyday life and not to change their level of physical activity throughout the training program.

We first performed the evaluation of dynamometry, where the elderly were evaluated placed in standing position, the equipment held comfortably in line with the forearm and parallel to the longitudinal axis of the body (QUEIROGA, 2005). The joint inter-proximal phalanx of the hand was adjusted under the bar, which was tight between the fingers and the region Athens. During the seizue manual, the arm remains immobile, with only the bending of joints and inter-phalanx metacarpus-phalanx. There were three measures is the right hand (GUEDES; GUEDES, 2006). The evaluations were performed before and after endurance training. Soon after the initial assessment the elderly were subjected to an endurance training, which was developed over a period of approximately one hour, three times a week, where individuals initially walked for fifteen minutes in the treadmill for heating, and then starting their endurance training with Leg Press 45, extensor chair, chair flexor, Calf seated, Bench press, Remada Seated, triceps Banking, Direct Threaded and Abdominal Bank, performing in the first four weeks 1 set of each exercise and, in the last four weeks, two sets of 10 to 15 repetitions, in the form of circuit training. In addition to endurance training the elderly participated in other activities such as dance and additional recreation.

The data were presented in the form of mean, standard deviation. A comparison of the strength before and after the program was carried out by “t” test for paired samples, provided that the assumptions of normality and homogeneity of variance were met. The level of significance was 0.05.

Results and Discussion
The purpose of this study was to investigate the effect of a program of resistance training in eight weeks in the handgrip strength in the elderly. Of the 40 elderly people who started the study, 11 withdrew, leaving 29 for reassessment. The percentage of valid samples and lost can be found in Graph 1.

The mean and standard deviation of the ages of the subjects who participated in the program was 66.5 ± 5.9 years. The table shows the average, standard deviation, minimum and maximum strength of handgrip before and after the program of resistance training.
The endurance training affects three aspects of life: the social, the psychological and the neurological, by increasing the interaction between individuals of the same age or inserting them back into society, since exercise improves the mood, reduces anxiety, prevent depression, and stimulate learning and memory. Regarding the physical aspect, exercising promotes increased cardiopulmonary capacity and flexibility, increased muscle mass, strength and bone mineral density and also reduces the percentage of fat and cholesterol and controls the glicemia (low blood sugar), among other benefits (RAUCHBACH, 2001).

Among the different variables of physical fitness, strength and aerobic endurance are the ones show change more clearly, as they directly affect the performance of daily activities, differenting tasks as simple as getting up from a chair and walking to a point to catch an object (Truccolo et al. 2002).

Problems in the joints, stiffness and loss of elasticity can lead to pain. These problems are caused by lack of physical activity. The resistance training also improves the elasticity of the muscles, improving blood circulation and the movement of the joints (OKUMA, 1998).

The American College of Sports Medicine (2007) indicates that senior citizens above 60 years, after twelve weeks of endurance training on 40 and 60% in the elderly.

A study presented by Westcott and Baechle (2001 cited by Mazo, Lopes; Benedetti, 2001), with 1132 individuals of both genders, who attended a resistance training program, from 61 to 80 years, increased on average 1.09 kilograms of muscle, suggesting a concomitant increase in muscle strength in elderly people.

The handgrip is a variable that allows important achievements of daily activities of this particular population (Spirduso, 2005). In this study, we found that the initial values of the strength of the elderly was 25.03 kgf. By comparing this result to the normative values of the handgrip strength of the general population proposed by Guedes and Guedes (2006) and Queiroga (2005) it appears that they are in a median level.

With the results achieved, we believe that after eight weeks of resistance training there was a significant increase in handgrip strength. These results corroborate with other studies related to the increase in muscle strength in elderly (FLECK; KRAEMER, 2006; ACSM / AHA, 2007; Mazo; LOPES; BENEDETTI, 2001).

The physiological process of aging is associated with sarcopenia, which is defined as the loss of total body mass and muscle strength related to age. Such changes occur regardless of the presence of diseases, and is also associated with the decline of a variety of stimuli of the nervous and hormonal systems and the environment in the muscular tissue (Wilmore; Costilla, 2001).

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The most important endogenous cause of the loss of muscle strength with aging is the loss of motor units in the nervous system (ACSM, 2007). Externally, the major cause of sarcopenia is the lack of physical activity (MENDES, 2006). The neuromuscular loss is 10 to 20% in muscle strength, resulting in decreased ability to maintain static force, a higher rate of muscle fatigue, and less ability to hypertrophy, leading to a deterioration in mobility and functional capacity of the elderly (TRIBESS; Virtuoso JÚNIOR, 2005).

Hakkinen et al (1998, cited by Fleck and Kraemer, 2006), found a significant increase of strength after ten weeks of endurance training, while Kugler et al. (2001) showed that after eight weeks of resistance training the subjects increased their handgrip strength of 2 kgf. Similarly, Mazo, Lopes and Benedetti (2001) and Virtuoso JÚNIOR (2005) showed an increase of 1.1 kgf in the handgrip strength.

Table Mean and standardeviation of the handgrip strength values before and after the resistance training program

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN</td>
<td>25.03</td>
<td>26.96</td>
</tr>
<tr>
<td>STANDARD DEVIATION</td>
<td>3.96</td>
<td>3.98</td>
</tr>
<tr>
<td>MINIMUM</td>
<td>18.0</td>
<td>20.0</td>
</tr>
<tr>
<td>MAXIMUM</td>
<td>20.0</td>
<td>37.0</td>
</tr>
</tbody>
</table>

The values of the strength of handgrip before and after endurance training attended the assumption of normality. The values of the test were normal Shapiro-Wilk W = 0.95, p = 0.25 and W = 0.97, p = 0.47, respectively.

Since the assumption of normality of the data was attended, the t test was used for dependent samples to compare the average of the values before and after endurance training. Graph 2 shows the comparison between the averages in assessing pre and post. There was a significant increase in the subjects' hand-grip strength when comparing the values before and after the resistance training program (p <0.0000). There was an increase of 1.9 kgf, representing an increase of 7.5%, comparing averages.

Gráfico 2 Box plot of the average values of handgrip strength in the evaluations before and after resistance training

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Conclusion
In this study, there was a significant increase in the handgrip strength in the elderly after a program of resistance training. Thus, it is possible to emphasize that strength training guided by a physical educator ends to play a major role in the prevention, conservation, rehabilitation and functional capacity of the elderly, allowing them to maintain independent lives, without many restrictions or problems resulted from inactivity.

Overall, the results of this study may contribute to the prescription and guidance of a resistance training program aiming the gain of handgrip in the elderly.

It is suggested that some other studies are done in order to look at other functional variables in the elderly, to verify and quantify other improvements arising from a program of resistance training.

References
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THE EFFECTS OF A RESISTANCE TRAINING PROGRAM IN THE HANDGRIP STRENGTH OF OLDER ADULTS

During the process of aging, it is observed that different components of physical aptitude related to health were reduced, such as fitness, strength, muscle resistance and flexibility. Among these components, muscle strength is one of the elements that are mostly reduced with aging, resulting in the reduction of the capacity to do day-by-day activities, like carrying objects, climbing stairs, standing up the sofa, and many others. The purpose of this study was to investigate the effect of an 8-week resistance training program in the hand-grip strength in elderlies. This study is characterized as almost-experimental. The sample was composed by 40 female elderlies, with ages raging from 60 to 75 years, living in Guarapuava-PR. These participants were evaluated before and after the training program. The result of the evaluation before training was 25.05 Kg. All the subjects increased significantly the hand-grip strength to 26.97 kg after training, having a modification of 1.9 Kg an average of 7.5% in the increase of hand-grip strength in elderlies.

Key-words: elderly; physical activity; hand-grip strength.