Comparison of the degree of flexibility and autonomy in elderly women practicing of tai chi e sedentary


Abstract: This study compares level of flexibility and functional autonomy in elderly women with $X = 72,61 \pm 4,04$ years old, participant a tai chi program of Rio de Janeiro State University (UERJ) and a sedentary group of a social project. Was used GDLAM protocol for functional autonomy and goniometry (DANTAS, 1999). The descriptive statistical used (.%). FCL 0,85%; FQ 0,34%; FJ 2,87%; for functional autonomy was: C10M = 26,82%; LCLC = 14,75%; LPS = 21,45%; LPDV = 29,41%. The distribution was considered normal by Kolmogorov-Smirnov test. The GDLAM index was regular for both groups. The tai chi practice improves functional autonomy levels for participants compared with sedentary group.

Keywords: Tai chi, flexibility, functional autonomy; aging

Correspondence to:
Rua Benjamin Constant, 60 apt 106 – Glória – RJ CEP 20241-150

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INTRODUCTION

Several current functional declines of the increase of the age are due to a sedentary lifestyle and a dynamics psicossocial that are extrinsic to the aging and, therefore, perfectly modified. So, the adoption of a healthier lifestyle, as the inclusion of a physical activity to regulate in the routine of the gerontes, it can be effective for an aging happened well (AMORIM 2002).

According to Matsudo (2000), it is researched forms to stop or to delay the aging process or strategies to guarantee a maintenance of the functional capacity of the autonomy, in the last decades of life.

The aging increases as the chronological age moves forward. The people become less active, their physical capacities decrease and, with the psychological alterations that they accompany the age (old age feeling, stress, depression), it still exists a larger decrease of the physical activity that, consequently, it facilitates the appearance of chronic diseases that contribute to deteriorate the aging process. So the chronic disease is the disuse of the physiologic functions that can create more problems.

The physical wellbeing consists of some components of the physical fitness: forces muscle, located muscle resistance, resistance aerobics, body composition and flexibility. When some of them is committed, there is a decrease of the well-being and of the autonomy. (ACSM 2003).

Benefits to the health link to the good form, reduction of factors of risks coronarianos, increase of bone density or maintenance of this (what reduces or it minimizes the osteoporosis risk), I increase of the flexibility, and improvement of the activities of the day by day. With the age, to do the activities of the daily routine can become a challenge Besides, falls, fractures, and the need of special cares indicate a weakness músculoesquelética. The more early the individual to begin to exercise, larger they will be the benefits to his/her health (KELL; BELL; QUINNEY 2001).

Landers et al. (2001) developed studies in youths’ groups and seniors and they observed that balance activities, flexibility and located muscle resistance can contribute to the ability of the gerontes in carrying out the Activities of the Daily (AVD) Life.

The absence of reasonable flexibility leads the individual to the largest possibility of lesions and functional problems, and treating of sedentary subjects in mature age. Studies revealed that age groups in mature age present reduction of the flexibility due to the largest loss of the articulate mobility than the muscle elasticity but the tendency is the inversion of the order of those factors. Ability of flexibility changes resulting from variations age, and other endogenous and exogenous factors(DANTAS et al., 2002).

Now, the engagement in the implantation of physical activities programs with holistic vision being observed the well-being physical, social, intellectual, emotional, vocational and spiritual (ARMBRUSTER; GLADWIN 2001), it has been providing to the geronte the necessary energy to carry out perfect psycho physiologic functionality(DANTAS 2002).

The comprehension of the necessity and benefits that the physical activities with this holistic vision provide to the health and increased the search for activities such like Tai Chi significantly.

Tai Chi was developed as a form of martial art originally and it is used centuries in China as exercise for the health, considering in other aspects and between the seniors particularly. Tai Chi basic exercise is a series of individual movements in a continuous way flowing smoothly to a movement for other.

The movements of the body are slow, soft, and well coordinated, maintaining the low center of gravity as it varies the form of execu-
tion of the exercises. Due to the nature of its performance, Tai Chi has been assuming favorable effect in the flexibility, in the balance control, and in the cardiorespiratory improvement, in senior people after a long period of exercises (HONG; LI; ROBINSON 2000).

In recent investigations Lan et al. (2002) observed that the practice of Tai Chi can lessen the decline of physical functions and it is an appropriate exercise for individuals of middle age and senior. Tai Chi can be prescribed as an alternative program. The intensity of Tai Chi exercise depends on the style, the posture and the duration of the training. The participants can choose to execute a complete sequence of Tai Chi or movements selected in agreement with their needs.

Tai Chi is a martial art that combines the movements with the circulation of the vital energy, breathing, and stretching techniques. It is a body and mind exercise, it is ideal for health, relaxation, flexibility, meditation, forces and personal defense. It is internationally popular for their effects and benefits in the health (WANG; CHEN; LIU; PEARL 2000).

It is a Chinese millenary martial art that encourages the mental concentration and the control of the body movements, it was only in the last years that began to appear the main scientific publications on Tai Chi effects in the physical fitness and the senior’s functional capacity. This activity represents an alternative for the senior. Those are in risk because of some problems associated to the aging, as arthritis, neurological dysfunction, general balance decline, coordination and locomotor function. Many things help Tai Chi nature in respect of the own person’s rhythm, being a no-stressful and no-competitive activity, as well as its ability of saving time, space, and equipment (YAN; DOWNING, 1998 apud MATSUDO 2001).

**OBJECTIVE**

The aim of this study had as principal objective to compare the degrees of flexibility and autonomy in practicing seniors of Tai Chi, participants of the project Universidade do Rio de Janeiro (UERJ), and a group of sedentary senior participants of a social coexistence project.

**MATERIAL AND METHODS**

**Sample**

The sample was selected following the researcher’s criterion intentionally being formed for female senior with $x = 72.01 \pm 4.00$ years, residents of the North Area in Rio de Janeiro, Maracanã.

The experiment had the 18 participants’ total divided in: nine apprentices of Tai Chi, of the project of the UERJ, and nine sedentary of social coexistence project. The participants filled out the term of spoilt (CNS,196/96) participation. It was considered who practice Tai Chi more than one year and, for the sedentary group, the one that didn’t practice has more than six months.

It was used the goniometry of 14 inches (Lafayette, USES) of North American production. In the autonomy, they were used a chair of

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Comparison of the results of the tests of autonomy of Tai Chi groups and sedentary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>C10M(seg)</td>
</tr>
<tr>
<td>Tai chi</td>
<td>73.33±4.30</td>
</tr>
<tr>
<td>Homogeneity</td>
<td>0.685</td>
</tr>
<tr>
<td>p</td>
<td>0.736</td>
</tr>
<tr>
<td>Sedentary</td>
<td>71.89±3.79</td>
</tr>
<tr>
<td>Homogeneity</td>
<td>0.594</td>
</tr>
<tr>
<td>p</td>
<td>0.872</td>
</tr>
<tr>
<td>Δ% (intergroups)</td>
<td>-</td>
</tr>
<tr>
<td>Test t indep.</td>
<td>-</td>
</tr>
<tr>
<td>p</td>
<td>0.015</td>
</tr>
</tbody>
</table>

fixed $t = 2,1199$; * value $p < 0,05$; Times in seconds; C10M = to Walk 10 meters; TUG = to Walk 3m; LPS = to Get up of the Seating Position; LPDV = to Get up of the Position Ventral Decubitus. Normal distribution in all varied (Kolmogorav-Smirnov).
In the descriptive statistics, they came the values found through the average and of the standard deviation. Later the test of Kolmogorov-Smirnov was applied to verify the homogeneity of the same ones. Due to the nature found distribution, it was opted in the inferential statistics to use the Test t of Student, being used as point of it accepts of the significance of the differences the p-value < 0.05. For the necessary statistical procedures the software was used SPSS 100.

PROCEDURES

In the flexibility evaluation the goniometric protocol was used proposed by Labiite (DANTAS 1999), for verification of the maximum capacity of width to articulate, in degrees, of the articulations: flexing of the shoulder, flexing of the lumbar column, flexing of the articulation of the hip, flexing of the knee. In the evaluation of the functional autonomy, the protocol was used GDLAM (DANTAS & IT IS WORTH 2004). The tests were: to walk 10 meters (C10M) (SIPILÄ et al. 1996); To get up and to Move around for the house (LCLC) (ANDREOTTI & OKUMA 1999); to get up and to sit down five times (LPS) (PODSIADLO; RICHARDSON 1991); and to get up of ventral (LPDV) decubitus (ALEXANDER et al. 1997).

PRESENTATION AND DISCUSSION OF THE RESULTS

The results will be presented through tables and comparative pictures of several studies where the levels of functional autonomy are observed in seniors for the accomplishment of the activities of the daily life.

It was observed in the Table 1 that, for the autonomy tests, the group that it participated in Tai Chi activity presented smaller values in most of the tests proposed that the individuals of the senior and sedentary group with exception the variable LCLC, where the last group presented better. It is worth to remind that the tests were checked per time. In this way, apprentices of Tai Chi that executed the tests they were better than the group of sedentary. These values obtained by Tai Chi group were enough to indicate a significant difference (p < 0.05) in the variables C10M and LPS.

To observe the percentile variation the practicing seniors’ of Tai chi group it was also shown better than the individuals of

| Table 2 - Pattern of Evaluation of the Functional Autonomy of the Protocol GDLAM |
|-----------------------|-------|--------|--------|--------|-------|
| Testes Classif.       | C10m (seg.) | LPS (seg.) | LPD (seg.) | LCLC (seg.) | IG (escores) |
| Poor                  | + 6.89     | + 11.47   | + 4.51    | + 43.00   | + 28.54 |
| Fair                  | 6.89-6.23  | 11.47-9.86| 4.51-3.48 | 43.00-38.69| 28.54-25.25 |
| Good                  | 6.22-5.58  | 9.85-8.35 | 3.47-2.78 | 38.68-34.78| 25.24-22.18 |
| Very Good             | - 5.58     | - 8.35    | - 2.78    | - 34.78   | - 22.18 |

C10m = to walk 10 meters; LPS = to get up of the seating position; LPD = to get up of the position of ventral decubitus; LCLC = to get up of the chair and to move around for the house; IG = index GDLAM. Source: DANTAS & IT IS WORTH 2004.

<table>
<thead>
<tr>
<th>Table 3 - Comparison of the results found with the pattern of Evaluation of Protocol GDLAM'S Functional Autonomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
</tr>
<tr>
<td>Tai chi</td>
</tr>
<tr>
<td>Concept in the IndexGDLAM</td>
</tr>
<tr>
<td>sedentary</td>
</tr>
<tr>
<td>Very good</td>
</tr>
<tr>
<td>Fair</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Concept in the Index GDLAM</td>
</tr>
<tr>
<td>sedentary</td>
</tr>
<tr>
<td>Fair</td>
</tr>
<tr>
<td>Good</td>
</tr>
</tbody>
</table>

| Picture 1 - Studies on tests of functional autonomy in senior. |
|---------------------|----------------|--------|-----------|-----------|
| Studies (year)      | Training       | C10M   | LPS       | LPD       |
| Aragão. 2002        | RML            | 7.0    | 11.0      | 4.5       |
| Baptista et al. 2004| Yoga           | 6.25   | 7.55      | 2.92      |
| Pernambuco et al. 2003| Shiatsu       | 7.46   | 12.95     | 5.73      | 54.12      |
| Vale et al. 2003    | dynamic flexibility | 5.44 | 7.70      | 2.90      |
| Varejão et al. 2004 | static flexibility | 5.35 | 8.30      | 2.54      |
| Pernambuco. 2004    | dynamic flexibility | 5.88 | 8.15      | 3.18      | 38.35      |
| Pernambuco. 2004    | Shiatsu        | 6.07   | 10.11     | 3.21      | 39.17      |
| Tai                  | Tai chi        | 5.33   | 8.39      | 4.08      |
| Sedentary            | xxx            | 6.76   | 10.19     | 5.28      |

C10M - Walking 10 metres; LPS – to get up the Sitting Position; LPD – to get up the Decubitus Ventral position; LCLC – to get up the Chair and move into the house; RML = Resistance Dystrophy Located
the group of sedentary, because they presented won in most of the variables observed with exception of the variable LCLC.

For a better observation will be used indice GLDAM’S table as parameter.

It is observed in the table 2 that satisfactory values are stipulated for the obtained results and an index of classification of these results. So we compare the obtained results with the Standard of Evaluation of Protocol GDLAM’S Functional Autonomy. IG. (DANTAS & it is WORTH 2004) it is observed that for the test C10M, the group of tai chi, it was considered as VERY GOOD, in the test of LPS it obtained the classification as GOOD and finally in the test LPDV reached Fair classification but for the general index the observed groups received the Fair classification.

It is observed that the practicing group of tai chi presented better concepts than the group of sedentary, suggesting that the physical proposal activity, in spite of presenting significant results (p < 005) partly of the variables, it demonstrated to provide more satisfactory levels of functional autonomy.

When verifying the picture 1 to proceed, it is noticed the researchers’ interest in studying the effects of the physical qualities in the autonomy seniors’ levels.

When comparing the results of this sample with the several studies, it is noticed that the group that practices tai chi is equipped in the test C10M to the groups that accomplished activities of dynamic flexibility, static and force, overcoming the groups that accomplished shiatsu, Yoga and RML (ARAGON, 2002; BAPTISTA et al 2004).

For the test of LPS it is observed that the group of tai chi overcame all of the groups presenting results as positive as for the group that accomplished activity of force. Already in the test LPDV, the same group that it equaled to the group of RML, being these considered results the largest, in other words, slower in comparison with the others observed.

In the variable LCLC, the groups here observed presented better values, in other words, faster than the group studied by Pernambuco (2003) and the apprentices of tai chi didn’t present as efficient as the sedentary ones when compared with the same author’s most recent studies. (PERNAMBUCO 2004)

This indicates that the seniors stay physically inactive along the life they should suffer the effects of the aging with larger impact. If they will practice physical activity, they tend to prolong the functional autonomy and the life quality.

Results of goniometric analyzed groups in this study and later they will be discussed.

It is observed in the Table 3 that the group of sedentary presented degrees of larger goniometric than the one of Tai Chi apprentices, in other words, better degrees of movement width. The values obtained by the group of tai chi were not enough to present a significant difference (p < 005).

Table 4 - Comparison of the degrees of flexibility of the groups Tai Chi and sedentary. FCL FQ FJ Tai chi

<table>
<thead>
<tr>
<th></th>
<th>FCL</th>
<th>FQ</th>
<th>FJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tai chi</td>
<td>77.00±8.97</td>
<td>95.33±30.94</td>
<td>139.33±8.66</td>
</tr>
<tr>
<td>Homogeneity</td>
<td>0.5</td>
<td>0.734</td>
<td>0.650</td>
</tr>
<tr>
<td>p</td>
<td>0.964</td>
<td>0.66</td>
<td>0.792</td>
</tr>
<tr>
<td>Sedentary</td>
<td>77.66±9.40</td>
<td>95.67±13.41</td>
<td>143.33±5.83</td>
</tr>
<tr>
<td>Homogeneity</td>
<td>0.582</td>
<td>0.510</td>
<td>0.771</td>
</tr>
<tr>
<td>p</td>
<td>0.887</td>
<td>0.957</td>
<td>0.591</td>
</tr>
<tr>
<td>Tests t indep</td>
<td>0.154</td>
<td>0.30</td>
<td>1.149</td>
</tr>
<tr>
<td>Â% (intergroups)</td>
<td>0.85%</td>
<td>0.34%</td>
<td>2.87%</td>
</tr>
<tr>
<td>p</td>
<td>0.888</td>
<td>0.977</td>
<td>0.267</td>
</tr>
</tbody>
</table>

t fixes = 2,1199; value p < 0,05 FCL = Flexing of the Lumbar Column; FQ = Flexing of the Hip; FJ = Flexing of the Knee. Normal distribution in all varied (Kolmogorov-Smirnov).
The variations observed among the groups that participated in this study were not expressive demonstrating that the observed sedentary seniors presented degrees of similar flexibility.

When evaluating the results in the picture 2 to proceed, it is noticed the researchers’ interest in studying the effects of the physical qualities in the levels of flexibility in senior.

It is observed in the previous picture that the group that accomplished tai chi presented result besides the standard value in the movement of FJ and being inside of the medium values for the articulations FQ and FCL, in the same way the group of sedentary presented satisfactory values when compared with the value reference. However the group of tai chi presented inferior results in all of the movements, when compared to the other tested groups.

When compared with other study was observed that the variables FJ stayed similar to the other striped studies in the picture 2. When comparing the variable FQ it is noticed that the apprentices of tai chi presented smaller values than the other studies. Li (2001), in study with 2216 senior, it observed the improvement of several factors, such as, cardiorespiratory flexibility, increment of the force and reduction of the risk of falls. Tsang (2004) it also observed improvements in the balance levels in seniors in a period of four weeks of intensive training of tai chi.

THE STUDY CONCLUSION

Based on the results obtained in this research can be concluded that the practice of the tai chi provided improvements in the functional autonomy for AVD, among Tai Chi apprentices, suggesting that the movements done during the classes can be a predictor in the maintenance.

The apprentices of tai chi and the sedentary participants presented similar values for the variable flexibility, contradicting the expectations of earnings of width of the arches articulate in favor of the group of tai chi.

For the group of sedentary they will be exposed the loss of the muscle force, the flexibility, reducing the functional autonomy and increasing the fall risk. It could be observed significant differences through a larger number of participants, where it will be possible to observe the benefits promoted by the tai chi.

REFERENCES


The swimming influence on balance in children

Abstract: The aim of this study was to verify if the practice of swimming has any influence on dynamic and static balance in children between three and four years old. The sample was composed of 39 boys and girls, divided in two groups: swimming practitioners (Experimental Group – EG) and children with no physical activity (control group – CG). All of children necessarily presented some kind of balance problem on pre-test. The Lefevre protocol (1972) was applied on both pre-test and post-test. The EG carried out 40 minutes swimming classes twice a week during four months. Among three-year-old children, during the pre-test, 47.6% of EG and 55.5% of CG could not carry out the test in a satisfactory way. Among four-year-old children, during the pre-test, 52.4% of EG and 44.45% of CG could not carry out the test in a satisfactory way. After four months of swimming practice the EG presented 70% less than negative results. 38% of EG three-year-old children and 47.6% of EG four-year-old children presented positive results equal or more than 75%. According the results of this study, swimming practice seems be important in three- and four-year-old children balance improvement, compared with children of the same age with no physical activity.

Keywords: balance; swimming; children.
The swimming is the more complete physics activity that exists, to work the harmony, the flexibility, the potency, the rhythm and the coordination. Practiced regularly, it develops physiologic mechanisms, as the lung capacity, the cardiovasular system and it allows the development of the coordination and balance (RAMALDES 1987). Other important advantages of the therapeutic effects of exercises in the water - such as promoting relaxation, to maintain and/or to increase the comprehensiveness articulate movement, to strengthen the muscles with increase of the force and resistance, besides improving the march functionally, involving the motive coordination and the balance - they can be proportionate with larger easiness. (WEISS et al 1998).

We know that the man’s habitual activity, in earth, involves a vertical position, with the leaning feet. So it is enough to provoke a small unbalance, positioning the feet one in front of the other. During the march, the legs have locomotion function, while the arms has balancing function. The movements of rotation of the head, associate to the remaining of the body allows to look in front of and around. Everything happens in a different way in the water. It tries to find a new balance position. It looks for the horizontal position. It stops to exist the fixed supports, just the system of forces in static balance, composed by the weight of the body, including the gravity and the impulse force, it provides to the subject the new balance position in the water. However, as much the mouth as the nose, in horizontal position, they find in the aquatic way an obstacle to win (DAMASCENO 1992). According to Garanhani (1997), all those aspects can be developed in the swimming class, with a fundamental exploration of the playful, what is very interesting when it wants to develop the motive coordination and the balance. The focus can be revealed efficient particularly to work such abilities in children. The same author, resells studies on motor development in children from 3 to 6 years, he confirms that the motive stimulation is adapted through diversifed experiences, that provide the development of basic motive abilities in children. the children’s balance is assured with three years old and the coordination arms-legs present rhythmic perfectly. They already get to up and down stairs, presenting good viso-motor coordination, besides independence in the daily activities (LE READS BOULCH 1992). The child demonstrates good balance of the body with four years old, with support in one foot just and for a more lingering time. It up and down stairs alternately, kip rope, it catches a ball with the two hands, it presents good coordination oculo-manual...
and good prehension of the objects of domestic use. It knows how to dress and to undress, but it can’t give bows and neither to button the clothing behind the backs (FONSECA 1998). It possesses larger balance, getting to walk in circular path, it hops for larger distances and it acquires larger domain in the action of to up and down stairs.

The balance in the aquatic way treats of construction and permanent readjustments that they put in play, an action loaded of emotion that it combines the movement, the affectivity and the symbolic, unstable and flowed, where it lets to be vital need and becomes to be a simple exit sign and arrival verticality (VELASCO 1996).

**OBJECTIVE**

Based on these studies we decided to verify, using the Protocol of Lefèvre (1972), if the swimming would exercise influence in the improvement of the dynamic and static balance in children of 3 and 4 years, that previously presented those alterations.

**MATERIALS AND METHODS**

**Sample**

The target population was composed by 39 children of both sexes, with age understood between 3 and 4 years. The experimental group was formed by practicing children of swimming, belonging to a Sporting Center; and the group control, for children that didn’t practice any physical activity, belonging to an Education Center, both in West, in the Municipal district of Rio de Janeiro. They were only considered for this study the children that, in the experimental group and in the control group, they presented balance disturbance in the pre-test, which a space of 102 subjects, being 50 practicing children of swimming and 52 that didn’t practice any physical activity, all of them selected by convenience.

In the pre-test, the protocol of Lefèvre was used (1972) to select children to present alterations of dynamic and static balance.

The sample’s total, 21 children were selected for the experimental group and 18 children for the group control, what reduced the sample to a total of 39 children, contained by sex and age.

**PROTOCOLS**

The Protocol of Lefèvre was used (1972) to show the evaluation of the balance condition, according to the next description:

**APPLIED TESTS TO CHILDREN OF 3 YEARS OLD (LEFÈVRE 1972)**

**Romberg’s test with open eyes:**

The child should stay in standing position with the feet together. Keep your arms extended over the body and eyes closed for a period of 30 seconds. It is observed if it will depart the feet, alteration of the positioning or abduction of the superior members, in the attempt to maintain or to recover the balance.

**Romberg’s test with closed eyes:**

Same to the previous the child will stay with the closed eyes to the same alterations to be observed.

**Running around obstacles**

The child will run around obstacles put in the road, they can outline tables, chairs or until the own examiner. The exam is destined to observe the dynamic coordination in a touched way. The child will fail when he/she doesn’t stray correctly the obstacles, when he/she loses the balance or when doesn’t alter the legs correctly.

**Walk straight forward**

The simple test that consists in doing the child to walk freely in the distance of 5 meters. It is marked with chalk in the ground, in the extreme points of the 5 meters, two separate references for 1m of width. The objective of the test is mainly to verify the direction of the march, because our subjects are normal. They are 3 years old and they walk well. They are not considered the synergistic movement synergistic of the superior members, because the exam situation turns the artificial march and a short distance does with that usually miss the synergistic movement.

**Take object in the ground without the other hand**

Ask the child picks an object in the ground and give it to the examiner. It will be observed if the child will catch the object with just one of the hands or if it will be necessary use the two hands.

**APPLIED TESTS TO CHILDREN OF 4 YEARS OLD**

**Romberg’s Test**

The child should standing position with the feet together. Keep the extended arms along the body and the closed eyes for a time of 30 seconds. It is observed if it will happen removal of the feet, alteration of the child’s positioning or abduction of the superior members to keep or recover the balance.

**Walking on tiptoe**

The child should walk on tiptoe for a distance of 5 meters. It tries to observe if it will happen support of the heels outside in the ground, unbalance of the body or diversion out of the lane about one meter.

**Up and down stairs**

The child should up and down stairs with six steps approximately without to support in the handrail or receive the examiner’s support, it should alternate the feet. It tries to observe if it will happen support or if the child won’t get to alternate the feet.
PROCEDURES

It is important to emphasize that in the experimental group all children were submitted to the swimming practice by a minimum time of 4 months, twice a week, in classes with duration of 40 minutes. All the subjects presented the same or superior frequency to 75% in classes.

Experimental Group: They practiced the swimming in semi-Olympic swimming pool, heated up with medium temperature of 28ºC, for 40 minutes, 2 times a week. Total of 21 children; 3 years: 6 boys and 4 girls; 4 years: 5 boys and 6 girls

2) Control group: Children that just practiced their daily and school activities but they didn’t have swimming practice. Total of 18 children, being: 3 years: 5 boys and 5 girls; 4 years: 4 boys and 4 girls.

ANALYSIS OF THE DATA

The present study observed the basic considerations in the statistical treatment, for the maintenance of the scientificity of the research. The significance level was considered of p < 0.05 and 95% of probability for the affirmatives and / or negatives that the study to denote.

They were used techniques of the descriptive statistics, in the sense of characterizing the Universe researched. The inherent limitations to the size of the sample (n = 39), all the affirmatives and/or negatives that were found are restricted to this study in particular, with objective of limits the inductive method.

RESULTS

In the 3 year-old group, 10 children (47.6% of the sample of the experimental group) didn’t get to realize the test in a satisfactory way, being 4 female and 6 male, while in the group control, the corresponding values for the same result and age group were 55.55% of the sample, which means a total of 10 children, being

<table>
<thead>
<tr>
<th>sex→ age↓</th>
<th>boys</th>
<th>girls</th>
<th>Sample’s Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
<td>5</td>
<td>5</td>
<td>55.55%</td>
</tr>
<tr>
<td>4 years</td>
<td>4</td>
<td>4</td>
<td>44.45%</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>9</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the 4 year-old group, 11 children, (52.4% of the sample of the experimental group) they didn’t get to realize the test in a satisfactory way, being 6 female and 5 male, while for the group control, the values found for that age group were 44.45%, which it corresponds a total of 8 children, being 4 female and 4 male (Table 1).

After 4 months of practice of the swimming, all the participants of the experimental group were revalued, being observed in the negative results in 70% of the participants, in other words, it gets better of the presented alterations. In the 3 year-old age group, 8 of the 10 children evaluated presented important improvement in their tests initially, which corresponds to 38% of the experimental sample, with positive result equal or superior to 75%, being 5 female and 3 male. In the 4 year-old age group, 10 of the 11 children evaluated presented improvement in their tests initially, which corresponds to 47.6% of the experimental sample, with positive result equal or superior to 75%, being 5 female and 5 male (table 2).

The group controls was revalued also after 4 months, however, in the 3 year-old age group, only 1 female child presented improvement in the balance tests, corresponding that value to 5.55% of the sample for that group; while, in the 4 year-old age group, no child presented improvement in the balance (Table 2).

Through the statistics inferential, for the test no parametric Chi-square, they were analyzed the distributions comparatively observed between the two groups, Control and Experimental, for the two stratum temporary pre and pos. A significance level was used p < 0.05 for rejection of the null hypothesis, which, equality between the distributions, being arrived to the following result: Chi-square

<table>
<thead>
<tr>
<th>sex→ age↓</th>
<th>boys</th>
<th>girls</th>
<th>Sample’s Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
<td>1</td>
<td>-</td>
<td>5.6%</td>
</tr>
<tr>
<td>4 years</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>After 4 months of swimming</td>
<td>1</td>
<td>0</td>
<td>5.6%</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>8</td>
<td>85.6%</td>
</tr>
</tbody>
</table>

Table 1 - Distribution of the sample with balance alteration for the protocol of LEFÈVRE (1972), in agreement with sex and age (n=39)

<table>
<thead>
<tr>
<th>sex→ age↓</th>
<th>boys</th>
<th>girls</th>
<th>Sample’s Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
<td>3</td>
<td>4</td>
<td>47.6%</td>
</tr>
<tr>
<td>4 years</td>
<td>5</td>
<td>6</td>
<td>52.4%</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>10</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2 - Children that obtained improvement of the balance after experimental procedure, according to protocol of LEFÈVRE (1972) (n=39)
DISCUSSION

In swimming, it is important to point out that all moment is demanded that the student or the child redouble their attention to stabilize their posture inside of the water and to develop the exercises. This allow mental capacity to be enlarged to take advantage of acquisition of new postures and global development of their body.

Ayyash et al (2003) observed that about 2 to 10% of the child population is affected by disturbances in the motive coordination and balance, and that disturbance reaches more the masculine sex than the feminine sex. Of these, from 8 to 15% they are usually affected in the preschool age and about 5 to 8%, in the school age. The authors tell that activities that enlarge the knowledge and those children’s motive memory facilitate the decrease and minimization of such disorders.

We consider that the motive coordination is related with the balance, it can say one more time that the development of a child’s motive memory, not only it improves his/her communication capacity of perform movements and to relate to their environment.

Physical education exercises are good purpose to enlarge the fundamental abilities of the children’s movements and to increase the physical activity to improve the health. According to Beurden et al (2003), the physical conditioning developed in children of both sexes, with ages from 1 to 2 years and from 3 to 4 years, it increases the physical capacity, the agility in the development of the tasks, the cardio-breathing capacity and the development of the balance and of the motive coordination, being ideal not only the increase in the intensity, but also the frequency of the trainings weekly.

In our study, both groups presented negative results initially, in other words, difficulty to realize the tests of dynamic and static balance. However, we observed that, after the inference of the experimental treatment, the groups presented different distributions with statistical significance for p < 0.0001 < 0.05. Finally that it is significant the inference action of the proposed experimental treatment. We demonstrated that the practice of swimming acted in an effective way in the change of the experimental group front to the balance test and analyzed by the protocol of Lefèvre (1972).

The swimming practice can cause reduction, not only of small disturbances neuromotors, as well as to facilitate the acquisition of the knowledge of new abilities. The stimulation of the children’s motive and cognitive potentialities in the aquatic way favors, self-knowledge, their corporal understanding, what also facilitates the learning of new abilities, starting from the knowledge it started. All proportionate acquisitions for the aquatic way are noticed in the first three months of constant of swimming practice (LANGLEY & he/she WHISTLES 1979; WEEKS & KORDUS 1998).

To the contrary of Lefèvre (1972), Behrman et al (1997) pointed out that 3 year-old child is already capable to alternate the feet when up and downstairs, as well as 4 year-old child can jump with one foot. In our study, the 4 year-old children didn’t alternate the feet when they up and downstairs.

As it can be observed, the swimming is an important physical activity in the improvement of the motive alterations, what could be evidenced in our study, that it focused the balance during the motor development, in children of 3 and 4 years evaluated through the protocol of Lefèvre (1972).

CONCLUSION

The regular practice of swimming, in agreement with what was evidenced in our study, it demonstrated to be a relevant factor, with respect to the improvement of the balance in children of 3 and 4 years, in relation to children of the same age group that didn’t practice swimming or other physical activity.

The motive stimulation through experiences diversified that they provide the development of basic motive abilities for the children, associated to the swimming, for being a practice that is developed in a favorable discovery of new movements, it is efficient in the acquisition of movements and motor enrichment.

Table 3 - Distribution of the sample for group after experimental procedure in relation to execution (positive) and no execution (negative) of the balance tests (n=39).

<table>
<thead>
<tr>
<th></th>
<th>Control Group n=18</th>
<th>Experimental Group n=21</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results</td>
<td>FA</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>17</td>
<td>94.4%</td>
<td>20</td>
</tr>
<tr>
<td>Positive</td>
<td>1</td>
<td>5.6%</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100%</td>
<td>39</td>
</tr>
</tbody>
</table>
We observed that besides the benefits related to the acquisition of motive ability, it happened integration among the children, facilitating the harmonious development of the body and the improvement of the mental agility, what certainly will be reflected around in their relationship with the world.

In that way, besides all of the benefits already proved scientifically, the swimming can be a physical activity of fundamental importance for the correction and improvement of those small balance disturbances in children of those age groups.

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Hemispheric correlation with psychomotor learning in manual communication tasks

Abstract: The objective of this study was to establish a correlation between hemispheres and the psychomotor learning in connection with the gesture communication. According to Moura (1993), when the gesture communication is practiced, especially in the Brazilian Sign Language (LIBRAS), each of the brain hemispheres of the listening person reveals a decode predominantly different. Therefore, left hemisphere prevails the linguistic functions, and right hemisphere the space-vision. In this survey we had the participation of one hundred students of both sexes, between 15 and 17 years old, with high school level attending one private school in the city of Rio de Janeiro. Once selected, the group was submitted to the CLEM TEST to identify the preference of the hemisphere processing. The students were divided in three hemispheric groups, that is, the right hemisphere (HR), the left hemisphere (HL) and the bi- hemispheres (HRL). The components of each group were then submitted to a individual selective test including significative competency in relation to the communicative gestures signs. Analysis of variance was performed between the three groups ($p < 0.05$). The specific sign, regarding the performance of each student, indicated evidences that the linguistics aspects are preferably processed in the left hemisphere.

Keywords: Hemisphericy, gesture communication, Brazilian Sign Language (LIBRAS)
INTRODUCTION

The brain is divided in two parts, and these are denominated hemispheres. In general, the left hemisphere controls the right half of the brain, and vice-versa, in reason of the crossing of the nervous fibers in the area corresponding to the encephalic trunk. The cerebral hemispheres seemingly are same, but, in the reality, they have anatomical differences, neurochemistry, functional, that, in a certain way, they are defined genetically, but that are perfected with the maturation, with the interaction with the middle, providing like this the specialization of each hemisphere. Other asymmetries can also be present in human brains (BRODAL 1984).

In the present study, we understand as accentuated cerebral hemysphercity its tendency of the processing of information of being represented in one of the hemispheres, independent of the individual’s specificity. In other words, it is the superior capacity of one of the hemispheres on the other, for the execution of certain functions.

In most people, the area of drill is located in the cortical area of the frontal Lobe of the left hemisphere, being responsible for the understanding of the language and for the production of the speech. The area of Drill realizes the planning of the movements for the production of the spoken language and also the grammatical organization. The area of Wernicke is responsible for the understanding of the spoken language and it is located in the cortical area parieto-temporal lobe (CUPELLO AND MIRANDA 2003).

The reference of the linguistic functions is determined genetically, but the manual preference can be determined for the environment. It is also possible affirms that the left hemisphere is related with the verbal abilities, while the non verbal abilities depend more of the right hemisphere (BRODAL 1984). The cerebral hemysphercity is not related only to the genetic factors, ripening, neurochemistry already mentioned, but also to other influences as asymmetrical postures during the prenatal period. These postural asymmetries favor differentiated hemispherical processing, so much perceptive as motors. Two thirds of the fetuses in the third quarter of the gestation are positioned with their right side externally. Sensory stimulation side during the development pre and postnatal it can determine cerebral asymmetries (FERNANDES 2003).

The male fetuses have a right cerebral hemisphere larger than the left cerebral hemisphere. Besides, there are evidences that the masculine brain can be, in the average, more side or asymmetrical than the female. Those and other differences in the cerebral organization can be underlying about differences between genders, as, for example, the women’s most precocious maturarion, the women’s best acting in linguistic tasks, the men’s best acting in visuo-space tasks and the largest incidence of left-handers between men.

The nervous system of neonate is already well developed, which allows child gradually like: maturation, acquire the directionality sense, temporality, rhythm, laterality and motor coordination.
According to Goleman, mentioned by Fernandes (2001), from 5 and 6 years old, the hemispheres present relative plasticity in their abilities to develop different functions, and only then begin to specialize.

The symbolic functions dominate on motor from the tenth year of life. It is during the childhood that lateralization consolidates the specific processes of abilities, inside of the left and right cerebral hemispheres, being considered a normal population (FERNANDES 2001).

We usually have many communication forms through visual signs, like: the signaling homograph, used for the naval communication; the communication through signs in the airports, in the traffic etc. The Brazilian Language of Signs (Libra), the individuals’ bearers of deafness maternal language, is one in the communication ways that carry visually, through coordinated movements, structuring space-storm, and at the same time, it is a symbolic form of communication, presenting emotional connotations that are transmitted through facial and corporal expressions.

The Language of Signs presents characteristics which each one of the cerebral hemispheres of people listeners, develops different hemispherical characteristics. Considering the concepts already mentioned, presents in individuals with different hemispherical processing, this work aims to verify in the individuals already selected, through CLEM’S test application, as right hemispheric, left and bi-hemispheric, which difference in the processing involving a communication for visual signals. So we went through some signs used in the Brazilian Language of Signs, which includes linguistic functions accomplished preferentially by individuals of left hemispheric. At the same time, this communication wants not only the precept-visual, the transposition of the visual for manual and expressive corporal movements, using the space perception, the space relationship, rhythmic sequential movements and memory, being these more pertinent aspects to the right hemisphere. Considering the concepts already exposed, we questioned which is the hemisphere that best processes linguistics function much related with the left hemisphere, and visual-space functions, own of the right hemisphere, or both hemispheres participate in equality.

**METHODS**

**Sample**

After CLEM’S exam application in 100 individuals, selecting them as GD, HE and BH, all in the age group between 15 and 17 years old, it was realized the study with reference to the LIBRA’S learning with the 23 individuals’ participation.

**INSTRUMENTS**

**CLEM’S Exam**

The Conjugate Lateral Eye Movement exam (CLEM) is correlated highly by scientific parameters with significantly indexes, compared to the results obtained through the electroencephalography and the tomography by emission of protons (FAIRWEATHER AND SIDAWAY 1993), which objective is to detect the tendencies of preference of an individual’s hemispherical processing.

Some careful in the application of the test have been done, for example, individual application in physical conditions, mental and emotional appropriate to the procedures and objective of the test, avoiding in that way visual and auditory distraction.

The present test was applied with the individual sit down, inside of an own cabin. It was realized a filming of the direction of the movements of the eyes, relating pertinent subjects to the nature of each hemisphere, or relatively to the individual’s bi-hemispherical nature.

They were selected and applied questions whose objective was to examine the right hemispherical training. The against-lateral reaction of the eyes was registered by the camcorder and analyzed during the processing of its answer. The results were checked through the comparison of the movements of the eyes, with the subsequent posterior tests of groups of hemispheric SD.

**Table 1 - Presentation of the averages of groups and hemispheric Standard deviation And their subsequent posterior tests.**

<table>
<thead>
<tr>
<th>Grupos hemisféricos</th>
<th>Média</th>
<th>DP</th>
<th>Teste posterior (Tukey) Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD (G1)</td>
<td>4.60</td>
<td>1.34</td>
<td>HD x HE (0.04) e BH (0.004)</td>
</tr>
<tr>
<td>HE (G2)</td>
<td>6.50</td>
<td>1.04</td>
<td>HE x HD(0.04) e BH(0.689)</td>
</tr>
<tr>
<td>BH (G3)</td>
<td>7.00</td>
<td>1.18</td>
<td>BH x HD(0.004) e HE(0.689)</td>
</tr>
</tbody>
</table>

**Picture 1 - Plot of scores of hemispheric groups correspondingly to the test of LIBRAS’ language**
through the images registered in a videotape, also marking the look movement in the records containing the illustrations type “clock face”, according to Borg (1983), mentioned by Fairweather and Sidaway (1993). Later, it was made an analysis between the registrations of the images and the cards, to have the guarantee about the results.

**List of Signs**

For the verification of the differentiated capacity of reproduction, understanding of the signs involving space positions, directionality movements praxis fine sequential, it was used a list of Ten LIBRAS’ signs. The following signs were used: good morning, thanks, difficult, work, man, to ask, friend, dog, to be born, white.

**PROCEDURES**

The research was accomplished individually, in the morning, in a room with good luminosity and silent. The individuals already selected as differentiated hemisphercy (HD, HE and BH), initially they received the explanation about nature’s research. It was also questioned the previous knowledge of the LIBRAS’ signs. It only participated the ones that didn’t know the same ones. An individual training was realized, with twice presentation of each sign by the researcher, and reproduction, for twice, for the participant. After this training, ten signs were reproduced in sequence by the researcher. Finally, it was requested the participant the reproduction one by one, as each sign was named by the researcher.

**Evaluation**

They were counted as successes the exact reproduction of the tested signs, so much in relation to the visual space aspects, to the coordination of the movements, of its directionality and the linguistic meaning of the same ones.

**Statistical Treatment**

The data from results of the presentation of the LIBRAS’ signs were studied through an Analysis of Variance model Oneway, with subsequent tests of Tukey, to define the direction of the possible differences among groups. It was used also descriptive statistics, with averages and deviations shown in comparative tables. For the test of the main hypothesis, the probability of alpha mistake was used = or - of 0.05.

**RESULTS AND DISCUSSION**

As explained previously, the medium results of reproduction and learning of the LIBRAS’ signs were plotted under comparative form in the Table 1.

For a better visualization of the result above, the same was plotted in the illustration 1. It observes in the referred illustration, the differences produced in reference to the hemispherical characteristic of each group.

The results of the Analysis of Variance used in the study of data of the tests, indicated to have a statistical significance as shown in Table 1. In other words, with F (2,19) 77,14; the < 0.05. Being used the subsequent tests of Tukey, it was evident that the group of individuals bi-hemispherical was superior significantly in performance than the right hemispheric group, and also superior to the left hemispheric group, however, in this case, without considerable significance. It also revealed that detailed analysis, which the left hemispheric was better than individuals right hemispheric.

It was possible to end, after the comparison of the obtained results, among the individuals HD, HE and BH, significant favorable prevalence to the individuals HE on HD, suggesting that in the same ones, when the communication is not realized verbally but it is realized through visual space movements, with emotional connotations, whose competence is more pertinent to the right hemisphere, nevertheless, LIBRAS presents larger processing incidence in the left hemisphere, signaling that the linguistic aspects prevail on the space in the learning and comprehension of the LIBRAS. In relation to BH and it didn’t happen significant prevalence.

Finally we concluded after the comparison of the results obtained among the individuals HD, HE and BH, a significant favorable prevalence to the individuals HE on HD, suggesting that same when the communication is not realized verbally but it is realized through visual space movements, with emotional connotations, whose competence is more pertinent to the right hemisphere, nevertheless, LIBRAS presents larger processing incidence in the left hemisphere, signaling that the linguistic aspects prevail on the space in the learning and comprehension of the LIBRAS.

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Predominance type of fiber muscle and its relation to the aerobic capacity tests for runner of fund proof

Maria de Nazaré Dias Portal  
Programa de Pós-Graduação Stricto Sensu em Ciência da Motricidade Humana na Universidade Castelo Branco – UCB  
Secretaria Executiva de Esporte Lazer/ Bolívia do Governo do Estado do Pará.  
nazareportal@yahoo.com.br

Claudio Luis Toledo Fonseca  
Programa de Pós-Graduação Stricto Sensu em Ciência da Motricidade Humana na Universidade Castelo Branco – UCB  
cfl@ig.com.br

Artur Luis Bessa de Oliveira  
Programa de Pós-Graduação Stricto Sensu em Ciência da Motricidade Humana na Universidade Castelo Branco – UCB  
arturbessa@ig.com.br

João Luís da Silva Sequeiros  
Programa de Pós-Graduação Stricto Sensu em Ciência da Motricidade Humana na Universidade Castelo Branco – UCB  
joaobauduco@ig.com.br

Emanuel Fraga de Oliveira  
Programa de Pós-Graduação Stricto Sensu em Ciência da Motricidade Humana na Universidade Castelo Branco – UCB  
emanuelrl@ig.com.br

Sandro Gonzaga de Arêdes  
Programa de Pós-Graduação Stricto Sensu em Ciência da Motricidade Humana na Universidade Castelo Branco – UCB  
sgaredes@ig.com.br

Max Luciano Dias Ferrão  
Laboratório de Biofísicas da Motricidade Humana LABIMH  
maxferrao@ig.com.br

Estêlio Henrique Martin Dantas  
Programa de Pós-Graduação Stricto Sensu em Ciência da Motricidade Humana na Universidade Castelo Branco - UCB  
estelio@cobrase.com.br

Abstract: The aim of this study was to verify the predominance of muscular fiber type and it’s relation with the aerobic capacity. The sample consisted of 10 subjects, endurance runners of military police team of Rio de Janeiro, with an average age of 34.9 ± 7.3 years, 14.00 ± 6.38 years of experience and the following anthropometric measurements: weight 66.32 ± 8.37, height 1.76 ± 0.07, %fat (3 skinfold Pollock & Jackson protocol -1993) of 7.21 ± 3.52; and somatotype determined with the Health & Carter protocol (1990): endomorfinism 1.8 ± 1.02; mesomorfinism 4.1 ± 1.20 and ectomorfinism 3.2 ± 1.34. To evaluate the aerobic capacity it was used the running test of Ribisl & Kachadorian (3.200 meters). To determine the fiber type it was used the dermatoglyphic method, and to determine the dermatoglyphics it was used the method of Cummins and Middle (1942) (SQTL=137,4 ± 22,2; D10 = 12,9 ± 2,5). Descriptive statistics were performed. The results allow us to conclude that endurance athletes of Rio de Janeiro have, according with the dermatoglyphics standards, a predominance of glicolytics fibers over the oxidative fibers. It’s suggested by the high number of SQTL found that there is a predominance of the glicolytics fibers over the oxidative fibers.

Keywords: Aerobic Resistance, Muscular Fibers, Dermatoglyphy.
INTRODUCTION

The skeletal muscle can be divided into classes based on histochemical and biochemical characteristics of individual fibers. Historically, the muscle fibers were classified into two general categories: (1) fiber fast or (2) fiber slow (BUCHTHAL; SCHMALBRUCH, 1970; BURKE, 1986; EDGERTON, 1983.1986 apud POWERS; HOWLEY, 2000). Although studies have shown the existence of 7 distinct types of muscle fibers: I, IIA, IIB, IID, CI, CI (VRBOVA; PETTE, 1992, apud FRY et al, 2003). Studies have shown that athletes from different sports (cyclist x runner) have different percentages of muscle fibers. While cyclists athletes have a higher prevalence of fast contraction of fibers, runners show the opposite, the predominance of slow contraction of fibers (LARSSON et al 1979; INBAR et al. 1981, LEXELL et al. 1983, LEXELL et al. 1983, TESH; KARLSSON 1985, SADOYAMA et al. 1988).

The aerobic capacity is influenced by a number of factors as: the heredity, training, age, sex, body fat, muscle participant (SHARKEY, 1998).

The aerobic exercises are those which are located below the point where the acidity of intramuscular liquid reaches the pH of 6.4, below the anaerobic threshold. The primary goal of the training focuses on aerobic muscle, or the ability of muscle fiber make the production of oxidative or aerobic energy, through the absorption of oxygen in muscle activity.

According to Fernandes Filho (2003, p.131), the aerobic capacity can be defined as the ability to perform activities that are dynamic and involve large muscle mass with high moderate intensity for long periods, being dependent on the functional state of the respiratory systems, cardiovascular, muscle and its physiological-metabolic relations.
with the glycolytic group; present a positive result when compared with the literature suggests that a better weight loss in people with dominance of oxidative fibers.

**OBJECTIVES**

This study searches to verify the predominant type of muscle fiber, obtained by dermatoglyphy, athletes of evidence of substance and relations with these aerobic capacity.

**MATERIALS AND METHODS**

**Ethics search**

This study meets the standards for the conduct of research with human beings, as the National Health Council, respecting the Guidelines and Standards Regulatory Research involving human beings, with effect from October 10, 1996, Resolution No. 251, and agreed at the Research of Ethic Committee of the UCB.

**Characterization of the sample**

For this study were selected 09 individuals with intentional way in the corridors of fund proof. It was selected the Military Police team of Rio de Janeiro, all volunteers, aged $x = 34.9 \pm 7.3$ years. According to Flegner & Days (1995, p. 48), selected samples would be necessary when the participants have similar characteristics.

As a criterion for inclusion, were accepted those individuals who were participating in regular training at least six years of practice.

**Procedures to the Research:**

For the characterization of the sample was realized a verification of the weight, height, the percentage of fat (Pollock & Jackson, 1993 / 3 folds) and sumtype of Heath & Carter (1990). To determine the type of muscle fiber was chosen the dermatoglyphic method of Cummins & Midlo (1942, apud FERNANDES FILHO, 1997). The verification of aerobic capacity was accomplished through the test of 3,200 meters (BOUZAS; GIANNICHI 1998, p.124-125).

**Instrumentation**

For checking the weight and height was used a balance estadiometry (FILIZOLA-BRAZIL), and the variables related to body composition (percentage of fat and sum type) were used: compass of skinfolds (LANGE-USA), paquimetry and anthropometric tape(SANNY-BRAZIL).

They wore a digital pad for the fingerprints verification, model 250 (IMPRESS-BRAZIL). The aerobic capacity was measured by using a stopwatch (CASSIO-JAPAN), for taking the time during the course of the test.
Protocol

During the test of 3,200 meters, a runway of 400 meters was demarcated and was given to the participants of the study that searched the distance (8 laps) in the shortest time possible.

The verification of fingerprints was carried out by the painting of the distal phalanx of each finger and then with a mild movement in only one direction (from one side to the other side of the finger), put up a finger in a sheet of paper to annotate of fingerprints.

The type of fiber was evaluated by the dermatoglyphic method (Cummins; MIDLO, 1945 apud FERNANDES FILHO, 1997). The method of collection called dermatoglyphy detects the fingerprints and conducts then their processing. Cummins; Midlo (1945) explain that the procedure for obtaining fingerprints, the fingers should be washed well before, so that the entire surface to be printed is covered with a layer of regular paint. The distal phalanges have to be covered with ink on the side of valar surface and the side until the nails. So to impress in a complete way the distal phalanges, you must tighten the nail, with all care, without moving, turning the finger at the same time. In this case are presented three designs: the Arc (A) - without drawing deltas, and is characterized by the absence of triradios or deltas, the Presilha (L) - has a design that represents the muscle fiber and glycolytic and the Veticilo (W) -- design that has two deltas, this design represents the oxidative muscle fiber.

Statistic Treatment:

This study was carried out through descriptive statistics, which were observed and the average values derived for the values of continuous nature, and the distribution tables of frequency for the discreet nature of data.

Presentation and Discussion of Results

The group of athletes had evaluated the characteristics, presented in Table 2.

It can notice that the time to practice is quite different in the sample.

The submitted group to the test of 3,200 meters, presented the results shown in Graphic 1.

The race background or strength is characterized by a proof which the aerobic capacity presents as an important determinant of performance. But, it is a fact that the evidence of resistance have different characteristics as the participation of the system of energy production and substrate used. Dantas (1995) shows more evidence of resistance and the predominant energy system (Table 3):

The results show that the group of background runners presented predominance of the design of fingerprint L > W in 80% of the athletes. This fact suggests that the group has dominated glicolytic fiber or fast contraction in the composition of muscle fibers (Figure 2).

The group has an average of x = 62.9 ± 5.0 ml (kg. Min) -1 showing an excellent result for runner male (GHORAYEB et al., 1999). The results of the study show differences in the results presented in literature, Green (1986) Petta; Spamer (1986) apud Powers; Howley (2000), which put the glicolytic fibers have a relatively small number of mitochondria, limited capacity of aerobic metabolism. We can see that the table 2 the predominant system is the oxidative system for racing background.

The study realized by Carvalho et al. (2003) showed similar results concerning the verification of the predominance of fast contrac-

![Graphic 3 - Frequency SQTL](image)

![Graphic 4 - Drawings L and W](image)
tion of fibers, through dermatoglyphy in 12 male athletes of high performance demonstration of 10,000 meters of Rio de Janeiro.

We notice that an anaerobic component in resistance proof which distances are less than 10,000 meters, demonstrating that there is the potential fiber of fast contraction, corroborating the study of Hamill (2000); Fox (2001) (apud CARVALHO et al., 2003), which require that an activity above 30 to 40% of VO2max presents this profile of recruitment of fibers.

The formation of lactate from the anaerobic metabolism is important to allow the maintenance of physical activity during intense exercise, which the oxygen is not sufficient to energetic demand; the extent of accumulation of lactate can be used as an index of metabolism aerobic (GHORAYEB et al., 1999). Studies in wake rolling, cited by authors previously, suggest that the anaerobic threshold of trained individuals is 73% of VO2max showing a different effect of training in the anaerobic threshold and the VO2max, the anaerobic threshold appears to be more influenced that the maximum allowable oxygen.

The fiber type IIa, also known as fiber glycolytic slow, has biochemical characteristics and fatigue that are between the fiber type I and type IIb. Hence, conceptually, fiber IIa when trained on an aerobics present bigger characteristics of the oxidative system (POWERS; HOWLEY, 2000).

The results can be observed that the drawings L influence the design W, presented as the variables of dermatoglyphy, as in graphic 4.

As for other parameters used for determining rates of qualification as sports: the SQTL (sum of the total quantity of lines of the fingers of the hands) index D10 (assessing the intensity of drawings) can see that there is a direct relation between the test results SQTL and aerobic capacity. (Chart 3 and 5). According to Table 1, the group presents a high average value of SQTL = 137.4 ± 22.2, thus demonstrating good levels of resistance.

According Abramova et al. (1995): “[...a high index of D10 and SQTL correlate with the strengthening of dominant coordination and endurance. Maximum values of D10 and SQTL are geared to stress the qualities of the coordinating body.”

With the presented result the VO2max of the study group, while faced with the literature, we can see that the group does not have the profile of a corridor of resistance. When observing the average SQTL, which has good levels of resistance, suggesting that athletes can present a glycolytic fiber dominance of fiber IIa as mentioned previously.

We notice in the study, the individual who present the best VO2max has the least amount of SQTL, which is not what it was exposed previously. According to Wilmore and Costill (2001), the composition of muscle fibers is not a determining factor of success in sporting events, endurance, speed and strength, because other factors may influence such as: the cardiovascular function, motivation, training, the size of the muscles, among other factors. In the quoted case the person may bring a high tolerance to lactate, justifying this way the presented result in VO2max test realized.

CONCLUSION

The results permitted that the athletes of fund proof of Rio de Janeiro have evaluated present, according to dermatoglyphy parameters, predominance of glycolytic fiber in relation to the oxidative. It is suggested that the high number of SQTL found, there is a predominance of slow glycolytic fiber in relation to fast glycolytic fiber. The sample is not composed from athletes of high qualifying sport (world or Olympic champions).

It is recommended that more studies are conducted involving dermatoglyphic parameters and athletes of fund proof of highly qualified (world champions or Olympic) for verification of the found results in this research, correlating the results of an invasive technique (muscle biopsy), and that consumption oxygen was estimated by the Ergoxiometry, where he obtained the thresholds 1, 2 and VO2max.

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Morphologic Profile and Speed of Futsal Players With Regard to Playing Position

Kelly Samara da Silva
Professora de Educação Física
ksilvajp@yahoo.com.br

Francisco Martins da Silva
Professor da Universidade Federal da Paraíba
Laboratório de Estudos e Pesquisas em Treinamento – LEPET
fmsilva@online.com.br


Abstract: Nowadays the majority of sports are introducing morphologic traits and particular motor each other your own necessities becoming evident that these varieties influence in fulfillment of athletes. Just now was attended a learning about Futsal players childish and youthful categories of Paraíba-Brasil. Through varieties anthropometries, body composition and speed thus relating with positions for categories. Three teams did part of this learning besides they were championship finalist paraibano 2002 that in this categories were evaluated sixty-eight players, been thirty-four childish average age of 13,4 years old ± 0,7 and thirty-four youthful average age 16,3 years old ± 1,01. The indicators analyzed were stature, corporal weight, fold coetaneous and the test of 30 meters. The results were analyzed through test Turkey HSD and a test “t” of Student to independent varieties showing differences meanings in all of analyzed varieties and regarding play position only goalkeepers differentiated of other players, bus speed.

Keywords: Morphologic Profile; Speed; Futsal.

Endereço para correspondência:
Rua Jaime Gomes de Barros, 94 – Água Fria – João Pessoa – PB – CEP 58074-080

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INTRODUCTION

The interest in knowing the amount of the different body components (muscular mass, bone mass, vicerás and body fat) and their relationships with the sporting income appears of the necessity of obtaining relevant and define information concerning the structural and decisive patterns of the performance, while factors that facilitate and/or complicate the acting. The competitive sports assume peculiar characteristics in relation to the athlete’s morphologic and functional development, to example of the excess of body fat that, besides constitute during a game, according to WILMORE & COSTILL (2001), it also exercises strong influence on the acting in speed, endurance, balance, agility and potency.

Another complicate factor would be the low corporal weight in function of the deficiency of fat free mass also committing the athletic acting as the maximization of the fat free mass that favors the sports that demand force, potency and muscle resistance. Therefore, as much the fat excess as the deficiency of thin mass they associate the reduction of the athletic acting in fast sports.

Characterizing the Futsal as a sport of high demand of physical factors, technicians and tactical, it is justified the necessity to develop specific conditions, capable to promote fast and necessary attitudes in the execution of their motor gestures. The specificity added to the attractiveness of this sport practiced in clubs, schools and institutions that support and participate in tournaments and championships in several categories, it has been contributing significantly for to the evolution and the crescent recognition of Futsal in the society.

In agreement with the Brazilian Confederation of Futsal (CBFS), the official competitions only happens from the infantile and juvenile categories, phases in that teenagers are entering in the process of acceleration of the general development influenced by the puberty. The inferior categories already participates in regulated competitions for almost all the state federations (IX AX & GOMES 2001).

Differently of the soccer, the futsal is played in a block with official spread of 40x20, with the equips making available five holder players distributed in the following positions: goalkeeper - G, central - C, hauls right and left line. A and the pivot - P, besides seven to ten reservations according to the regulation of the competition.

The goalkeeper has the function of defending and attacking too, in agreement with the current rules. The central is known as the trapper and main marker of the team, the haul are responsible for the pattern of movement of the game and for the finalization and the pivot is that skilled and fast player in the function of arresting, to distribute and to conclude.

Those characteristics certainly demand physical capacities and specific motor patterns. Studies developed by ARAÚJO et al. (1996) determine that Futsal is a modality of intermittent character, being characterized by the prevalence of intense and short efforts with metabolic action of the three energy systems (anaerobe alactic, lactic and aerobium) with levels of predominance differentiated.

According to AXE & GOMES (2001), the aerobic resistance represents the essence of a departure of Futsal, being the lactic anaerobic resistance noticed in the alternations between the offensive and defensive actions, and the resistance anaerobic alactic evidenced, during the technical actions. In this sense, the speed has fundamental importance for athletes that compete in
sports with fast actions like Futsal and displacements, dribble, the feints and the kicks.

It is also known that the anthropometric characteristics and the body composition influences in a Futsal player acting. In that way it becomes necessary not only study those athletes’ morphologic profile, but also to relate them the game positions in reason of the demand type that the athlete is submitted.

Another current concern comes back to the study of the athlete’s profile considering their game position. It is important to analyze the athlete inside of their real conditions “specific”, because the morphologic structure and the capacities of physical acting exercise differentiated and important roles in the acting.

Considering the exposed above added to the lack of specific studies in the area, it was defined as objective of that study:

- To draw the anthropometric profiles of the players’ of Futsal speed that belong infantile and juvenile categories, relating them with the functions carried out in block;

REFERENCES

The athletes’ body composition has been investigated by several specialists involved with the sporting income. As the competitive demands increase, it also increase the concern in reaching desirable values of fat body and mass muscle ideals to the necessity of the sport.

Nowadays, the anthropometric technique is one of the procedures of larger applicability for studies of external measures of body dimensions (GUEDES & GUEDES 1998). This method is one of the spread and used in Brazil, once it uses low cost equipments of simple execution (LOPES & PIRES NETO 1996).

The anthropometry allows to measure the growth through the evaluation of the stature and the body weight, as well as the amount and the pattern of distribution of the fat body through the thickness of the cutaneous folds and sum of the different anatomical areas (GUEDES & GUEDES, 1998; COSTA 2001).

In relation to the calculation of the perceptual of grease are few the equations proposed for children and young among the existent ones stand out the equations that received larger acceptance, like BOILEAU (1985); SLAUGHTER et al. (1988); GUEDES & GUEDES (1998); HEYWARD & STOLARCZIK (2000).

The sum of cutaneous folds can happen in different situations, with the sum of folds of the members and the trunk separately, besides other combinations, for example, the sum of eight or nine folds (COAST 2001).

In the last times, the fat mass (MIG) became, also, an allied for the athletic acting and control of the performance. Studies developed by FILIN & VOLKOV (1998) verified that, during the first 15 years old, the weight of the muscles increases in approximately 9%, and in the 2 to 3 years (15-17/18 years) increase in 12%.

In relation to speed, understood as the capacity to realize motive actions with maxim intensity in a short space of time, it is quite influenced by the amount of MIG (HAHN, 1988; TAME et al., 1996; ADELINO et al 1999) and, also, for the age, sex, anthropometry, quality of the sporting technique, talent (GROSSER 1996).

The development is in function of the biological age and the child’s development, therefore children and young precocious develop their force earlier and they are capable to reach larger speeds in relation to those retarded development (TAME et al., 1996; WEINECK 1999).

For MANSO et al. (op cit), the reaction time and the cyclical speed reach the same values in children in ages prepuberal and puberal, when compared to adults, in function of the enormous plasticity that has the central (SNC) nervous system in this phase. For MOSKATDOVA (1998), the age of maximum development of the explosion and of the speed in the 30 meters for the young soccer players is between 11-13 years old.

WILMORE & COSTILL (2001), in studies with children and young verified that boys presented a gradual development in the time (s) of the test of speed as the age developed between 13 and 14 years T = 7.0-7.5 seconds and among the 15 to 17 years T = 6.5-6.8 seconds. In relation to MIG presented larger proportions between the 14 and 15 years, with gradual increase until the 20 years; for to MG, the results were close up to 15 years.

SILVA (1999) realize a study in PELOTAS / RGS with four juvenile futsal teams with average of 16 year-old age, which were evaluate in relation to the body weight, the stature and the percentage of fat and thin mass. The values didn’t present significance in relation to the game position. However, when compared by teams, just the adiposity differed a club in relation to the others.

KISS et al. (1999) presented anthropometric results (weigh body and stature) of a Futsal team with 16 individuals. The results pointed a stature of 177.6 ± 3.3cm and body weight of 76.4 ± 6.2kg. PEREIRA & SILVA (2000) studied the 12 athletes futsal profile player from Brazilian team university from 22 to 27 years old, finding the following results: thin mass 61,55kg, fat mass 9,3kg and speed in the 30 meters of 4,18 seconds.

<table>
<thead>
<tr>
<th>C</th>
<th>PC</th>
<th>E</th>
<th>%G</th>
<th>MIG</th>
<th>ΣT</th>
<th>ΣM</th>
<th>Σ8</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>53.0±11.8</td>
<td>163.7±8.9</td>
<td>16.7±5.9</td>
<td>43.7±7.5</td>
<td>41.5±24.4</td>
<td>42.6±15.1</td>
<td>84.1±37.8</td>
<td>6.8±0.4</td>
</tr>
<tr>
<td>J</td>
<td>62.1±8.3</td>
<td>172.7±6.3</td>
<td>15.5±3.4</td>
<td>52.4±5.9</td>
<td>40.3±13.6</td>
<td>33.4±7.0</td>
<td>73.6±19.2</td>
<td>7.3±0.3</td>
</tr>
<tr>
<td>DifX</td>
<td>-9.1</td>
<td>-9.1</td>
<td>1.2</td>
<td>-8.6</td>
<td>9.3</td>
<td>-9.9</td>
<td>1.2</td>
<td>-0.6</td>
</tr>
<tr>
<td>P*</td>
<td>.001</td>
<td>.000</td>
<td>.330</td>
<td>.000</td>
<td>.003</td>
<td>.808</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

Categories (C); Difference of Average (DifX) and p < 0.05 (P*).
SOUZA (1999) developed a study with soccer player of several categories relating the game position. The results pointed the increase of the body weight and the stature and the reduction of the perceptual of grease with change in category.

SILVA et al. (1997) and LEY et al. (2002) studied the anthropometric differences and metabolic between soccer players of the juvenile categories, junior and professional. Both studies verified significant differences in the anthropometric variable in the juvenile group, when compared to the other groups.

**MATERIAL AND METHODS**

According to THOMAS & NELSON (2002), the descriptive research is a type of study status used to characterize resolutions of problems through observation, analysis and objective and complete descriptions. The descriptive research of stamp developmental, through traverse cut makes possible the investigation of the growth and the body composition of the subjects in different age groups.

**Sample**

The population of this study was constituted by the three finalists teams (1st, 2nd and 3rd places) of the Championship Paraibano 2002, in the Infantile (I) and Juvenile (J) categories. In the total were appraised 68 players in the age group from 13 to 18 years old, being 34 of the infantile category, with average of 13.4 year-old age ± 0.7 months, and 34 of the juvenile category, with 16.3 year-old age ± 1.01 years.

Considering the game position, the sample presents the following distribution: 8 goalkeepers (4 infantile and 4 juvenile), 20 central, 20 lines and 20 pivots, distributed 10 for each category.

**Instruments and Procedures**

The athletes were appraised through the body weight, stature, cutaneous folds and a test of 30 meters. To facilitate the process, the speed was evaluated by a single person with three year-old experience in the chronometer handling through the test of the 30 meters in length, with a slowing down area from 10 to 12 meters.

The body weight was measured in a Filizola’s scale, accurately of 100g; and the stature was determined through a measuring tape with the precision of 0.1 cm fixed to a wall (without baseboard) in the moment of maximum inspiration executed by the appraised (GOR-DON et al.1988).

The body composition was evaluated through the mensuration of 08 cutaneous (tricipital, subscapular, suprailiaca, bicipital, axillary average, abdominal, medial thigh and medial calf) folds, using a pliometro model Harpenden for the constant pressure of 10g/mm2 and easy manipulation. The measures were checked in the right hemisphere of the body of the appraised, through the clamping with the thumb and indicator, in a total of 3 measurements accomplished consecutively in space of 4 seconds, being registered the medium value.

For evaluation of grease was used BOILEAU’s equation et al (1985): % G=1.35 (TR + IF). 0.012 (TR + IF) 2.44, developed through measures of references of multicomponent models, being more used for this population.

The fat free mass was obtained through the equation proposed by BROOK (1998), determining the fat (MG) body mass = body (kg) mass x body (%) fat / 100 and the fat body (MIG) = body (kg) mass. fat (kg) body mass.

It was realized the sum of folds to observe the distribution of the general body fat and in different areas of the body. For the area of the trunk the folds were used SE, SI, AX and AB, and for the members the folds were considered TR, BC, CXM and PR.

The speed was evaluated by a single person with three year-old experience in the chronometer handling through the test of the 30 meters, with stopped exit and race in the sense retilinear, accomplished in game block with measures varying among 36 to 40 meters in length, with a slowing down area from 10 to 12 meters.

**Picture 2 - Variables studied by category and position of game**

<table>
<thead>
<tr>
<th>G</th>
<th>C</th>
<th>P</th>
<th>E</th>
<th>%G</th>
<th>MIG</th>
<th>SDT</th>
<th>SMD</th>
<th>SBD</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>I</td>
<td>71.7±15.4</td>
<td>170.5±4.7</td>
<td>29.0±6.7</td>
<td>50.1±7.4</td>
<td>96.8±35.2</td>
<td>71.7±21.2</td>
<td>168.5±52.0</td>
<td>6.4±0.3</td>
</tr>
<tr>
<td>J</td>
<td>77.1±5.0</td>
<td>184.0±1.8*</td>
<td>17.4±2.4*</td>
<td>63.6±2.4*</td>
<td>47.8±15.2*</td>
<td>39.6±7.7*</td>
<td>87.4±21.6*</td>
<td>7.4±0.2*</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>I</td>
<td>48.6±10.1</td>
<td>160.2±9.9</td>
<td>14.6±3.3</td>
<td>41.4±7.7</td>
<td>34.9±6.1</td>
<td>38.4±3.8</td>
<td>73.3±7.4</td>
<td>6.7±0.4</td>
</tr>
<tr>
<td>J</td>
<td>63.3±5.6*</td>
<td>172.0±4.4*</td>
<td>16.9±4.2</td>
<td>52.4±3.2*</td>
<td>42.8±14.8</td>
<td>36.0±7.1</td>
<td>78.9±20.1</td>
<td>7.2±0.3*</td>
<td></td>
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<tr>
<td>A</td>
<td>I</td>
<td>51.5±8.7</td>
<td>164.0±9.3</td>
<td>15.6±2.9</td>
<td>43.5±7.7</td>
<td>32.4±6.9</td>
<td>38.6±8.8</td>
<td>71.0±11.5</td>
<td>6.8±0.3</td>
</tr>
<tr>
<td>J</td>
<td>57.3±6.1</td>
<td>170.5±5.8</td>
<td>14.0±3.2</td>
<td>49.2±4.8</td>
<td>36.4±13.7</td>
<td>30.4±7.0</td>
<td>66.8±19.9</td>
<td>7.3±0.3*</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>I</td>
<td>51.6±8.5</td>
<td>164.0±8.1</td>
<td>14.8±3.8</td>
<td>43.8±6.7</td>
<td>35.0±11.7</td>
<td>39.4±12.9</td>
<td>74.4±23.9</td>
<td>6.9±0.4</td>
</tr>
<tr>
<td>J</td>
<td>59.3±5.7*</td>
<td>170.1±4.5</td>
<td>14.7±2.4</td>
<td>50.5±4.3*</td>
<td>38.2±11.9</td>
<td>30.9±4.6</td>
<td>69.1±14.4</td>
<td>7.4±0.2*</td>
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</table>

**SIGNIFICANCE OF THE RESULTS BY GAME POSITION**

<table>
<thead>
<tr>
<th>G</th>
<th>C</th>
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<th>P</th>
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<tbody>
<tr>
<td>G</td>
<td>*</td>
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<tr>
<td>A</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>P</td>
<td>*</td>
<td>*</td>
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</tr>
</tbody>
</table>

PJ - game position (G - goalkeeper; C - central; A - wings; P - center); C - categories (I - infantile; J - juvenile); p * (< 0.05); p > 0.05 (-).
Two consecutive attempts were accomplished with an interval of 3 minutes, being considered the best. The result was exposed in meters per seconds (m/s).

All tests were accomplished in the night period in the fitness training team center with dates and schedules established by the trainers. The total duration of the collection of data was two weeks approximately and it happened in parallel to Paraibano’s Championship in second shift.

**Statistical Treatment**

The analysis of the results was used the descriptive statistics (average, standard deviation); the Tukey test HSD for multiple comparisons among the game positions for category; and the test t for independent variables, seeking to observe the differences for game position.

**RESULTS AND DISCUSSIONS**

The illustration below illustrates the behavior of the cutaneous folds for categories, where a decline of proportion of the folds is observed as the category moves forward, with significant reductions in the located cutaneous folds in the area of the members, when we compared the juvenile players to the infantile ones.

In relation to sum of the cutaneous folds was observed that the infantile group presented top and significant results so much for .T as for .M, when compared to the juvenile. It verifies the body fat refuses with the evolution of the age, other verification was the increase of MIG, with difference of average of 8,6kg in relation to the infantile, according to the picture below.

Another positive factor in the juvenile was the development of the medium speed with difference of 0,6 in relation to the infantile, which makes possible the influence between the increase of MIG and the improvement in the explosion (GROSSER 1996), besides other factors as the age and the trainability (WEINECK 1999).

Picture 2 illustrates the relationship of the body composition with the speed, considering the game position among the categories. In relation to body composition it was observed so much in the juvenile as in the infantile that those presented smaller amount of fat mass were the ones that obtained a larger speed.

These alterations are justified for the growth process and maturation presents in this strip of age with phases likely to the increase of the testosterone and development of the body structure (WILMORE & COSTILL, 2001; FILIN & VOLKOV 1998).

The table 2 describes the considerable differences in the presented results, considering the game positions and comparing them among categories. In that way it is observed that the juvenile goalkeepers presented significant results in all the variables, except in the body weight when compared to the infantile ones.

The central and the juvenile pivots presented significant values for the body weight, MIG and stature in relation to the infantile ones, while juvenile presented significant reductions in the sum

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**Illustration 1 - Behavior of the cutaneous folds for category**

P<0,05

**Illustration 2 - Body composition and the speed for games’ position**
folds of the members. In relation to speed, the juvenile category presented significant differences in all of the positions when compared to the infantile.

Analyzing the speed, it is verified that the infantile and juvenile line players presented a linear behavior of development, so central are the less fast players, the wings are the intermediate players of speed and the pivots, the fastest.

Another concern of this study was to verify, separately, for category if the characterized results by game position were significant in relation to the other positions. In agreement with the results it was verified only the goalkeepers presented significant results in the variables studied, except in the speed, when compared the other positions.

It is possible to affirm that the futsal players line didn’t present specific characteristics in the variables studied in relation to game position according to SILVA’S et al study. (1999).

**CONCLUSION**

According to the obtained results, we concluded the progress that category influences directly in the morphologic development and in the speed function of the morphofunctional alterations, the growth process, maturation and, also, of the training.

In relation to the game positions, the data pointed significance for the goalkeepers, mainly the juvenile ones when compared to the other positions. Finally it was verified futsal players from line presented a morphologic profile and similar speeds.

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Ergogenic Effects of caffeine in test of 3.200 meters

Abstract: The aim of the present study was to verify the ergogenic effects of caffeine over a maximum test of 3.200 meters. The sample was composed of 12 male athletes, with average age of 33.5 ± 8 years, height of 176.1 ± 7.8 cm, weight of 68.9 ± 8 kg and training time of 13 ± 7.3 years. Two maximum tests were performed during 3.200 meters. After the first test, there was caffeine abstinence and on the second, there was caffeine ingestion. It was observed that 11 out of the 12 athletes obtained an improvement in the average times of 8.08 ± 6.01 sec. The correlation coefficient of the paired “t” test presented a significance of p < 0.05. In conclusion, the use caffeine after a week of abstinence, produce significant ergogenic effect in the athletes’ performance in a maximum test of 3.200 meters.

Keywords: Ergogenic resource, caffeine, performance.
Efeitos Ergogênicos da Cafeína no Teste de 3.200 metros

Esta pesquisa tem como objetivo verificar os efeitos ergogênicos da cafeína em teste máximo de 3.200 metros. A amostra foi composta por 12 atletas, do sexo masculino, com idade média de 33,5 ± 8 anos, estatura de 176,1 ± 7,8 cm, peso de 68,9 ± 8 kg e tempos de treinamento de 13 ± 7,3 anos. Foram realizados 2 testes máximos de 3.200 metros. Após o 1º teste houve um período de abstinência de cafeína e no 2º houve ingestão da substância. Foi verificado que 11 dos 12 atletas obtiveram uma melhora nos tempos médios de 8,08 ± 6,01seg. O coeficiente de correlação do teste "r" pareado apresentou uma significância de p < 0,05. Concluímos que o uso da cafeína, após uma semana de abstinência, produz efeito ergogênico significativo na performance de atletas em teste máximo de 3.200 metros.


INTRODUCTION

Caffeine is consumed regularly for billion people around the world and it is essential to the economy of many countries. Caffeine belongs in the compound group of (Methylxanthine) and its principal chemistry composition is 1,3,7 (Trimethylxanthine). It belongs in the Purine’s basis group. Purine doesn’t occur in nature, but countless derivate are significant biologically. The basis of this group which has pharmaceutical importance are all the derivate of methylated of 2,6 dioxipurine xanthines. Xanthines are substances that can stimulate the nervous system, producing a state of alert of short duration (SILVA, 2003).

So 80% of general population uses this substance daily, although it is very difficult to know their quantity consumption. (Strain and Griffiths, 2000).

According to all this demand were realized many researches around the physiological effects caused by substance. Caffeine affects almost all organisms’ systems and its obvious effects occur in main nervous system (MNS). When it is consumed in short dosages (2mg/kg), the caffeine causes an increase of wakefulness state, and a fall of sleepiness, fatigue’s relief, breathing’s increase, increase in the catecholamine’s release, increase in the cardiac frequency and increase in the metabolism and diuresis.

But high dosages (15mg/kg) causes nervousness, insomnia, tremor and dehydration (CONLEE, 1991). In sports caffeine has been used by athletes in the search for ergogenic benefits that can improve the efficiency in their respective sports. Caffeine reduces the threshold of excitability and prolong the length of the period of active muscle contraction, in vitro, and increases the release of calcium from reticule sarcoplasmatic for sarcoplasm and inhibit the mechanism to recapture the calcium reticule sarcoplasmatic, making IONCa + more available to muscle contraction. In addition, this mechanism of action can only be detected experiments in vitro using high dosage of caffeine and concentration blood. It represents toxic effects to the organism. So it’s not possible that the calcium’s intracellular mobilization of reticule sarcoplasmatic represent a mechanism in the ergogenic effects of caffeine.

The most favorable mechanism to explain the ergogenic effects of caffeine is through their adenosine receptor antagonists function and to prevent its adenosine’s interaction, increase the level of CAM (Cyclic Adenosine Monophosphate), provoking a series of answers in the organism like: cathecholamine release, increase of blood pressure, lipolysis, increase of gastric secretion, increase of diuresis and the main nervous system activation (NEALIG & DEBRY, 1994; SAWYNYOK & YAKSH, 1993; TARNOPOLSKY, 1994). Beyond this mechanism, caffeine exerts an effect on the activity of the pump Na+-K+.. Caffeine influences in the regulation of extracellular concentrations of K+ in the middle of extracellular and intracellular, maintaining high concentrations in the intracellular and in the low extracellular, which contributes to the fatigue’s delaying.

Low concentrations of K+ in the plasma help to keep the excitability of the cell membrane in the muscle contraction and this can be another mechanism of action at a cellular level, that it is able to explain the ergogenic effects of the caffeine. (LINDINGER et.al. 1993). In the last realized researches, the assessed executed a physical activity with ergometric bicycle, in 80% VO2max, until the exhaustion, one hour late the ingestion of 330mg of caffeine. The evaluated had an increase of 19,5% in the endurance time (COSTILL et.at. 1978).Another research identified an increase in the performance of 7% in the quantity of work produced in 2 hours of isocinetico bicycle exercise, with ingestion of 250 mg of caffeine, but it is ally with carbohydrate (IVY et.al,1979).And another study proved that ergometric bicycle exercise in 65-70% VO2max, during 30 minutes, with caffeine ingestion of 5mg/kg, results in a economy of 42% of muscle glycogen (ESSING et al 1980).

Some studies show a relative increase of muscle force, and it came with a large resistance of fatigue’s vision after the ingestion of some...
high caffeine doses (KALMAR & CAFARELLI, 1999; LOPES, 1983; PINTO & TARNOPOLSKY, 1997; ROY, 1994). Although didn’t know the concrete way to the true mechanism of action that it’s responsible to the increase of muscle strength. However it is believed that this occurs at much higher intensity by the direct action of caffeine in SNC, than for its periferic level (KALMAR & CAFARELLI, 1999). It was a research using a dose of 9mg/kg of caffeine, it was related the increase in the time of endurance in the race and in the ciclysm of 44% and 51% respectively. Many years ago was identified that this dosage of caffeine of 9mg/kg already characterized urinary concentrations above established by COI, at that rate it considered doping (Pasman…); the International Olympic Committee classifies the caffeine as a restrict drug, positive at concentrations above 12mg/ml in urine. Since January 2004, caffeine is in the tracking program of WADA (World anti doping Agency), and it is not considered a prohibited substance, but being only looked at the competitions occasion (World anti doping Agency 2004).

In scientific literature examined, few studies have been found in relation to the training of force, high-intensity, speed and power. The studies examined a very large controversy in relation to the study in question. So in relation to maximum and supermaximum exercise of short duration, all studies of this natures is showing that the physical maximum exercise significantly (until 5 minutes). The maximum power of an athlete is the quantity of energy he uses every minute, if his consume is of O2. This VO2max will be same. In general, the PAM can’t be sustained more than 7 minutes uninterrupted and if the duration of the exam is big, the % Pam will be little (Graphic 1).

It was observed that the existence of some researches of work around the effect of caffeine in delaying of the muscular fatigue, evaluating the maximum times of exercises with submaximum intensities. In addition the objective of this present study is to determine if the effect occurs in times of races between 5 and 10 minutes, with maximum intensities.

**OBJECTIVE**

This research has the objective of verify the ergogenic effects of caffeine in the maximum test of 3,200 meters.

**MATERIAL AND METHODS**

**Sample**

The sample of the study was composed by 12 athletes, males, street race, since to 42 km, with average age of 33.5 + - 8 years height of 176.1 + - 7.8 cm, body weight of 68,9 + - 8 kg in training times of 13+ - 7,3 years, as it was showed in table 1 and in graphic 2.

There were three more subjects, a woman and two men, who were removed from the sample because they suffered heavy gas-tic ailment before and during the test because of “sensitivity of caffeine”. People declared be non-smokers, non alcoholic drink consumers, only 2 people informed that they drink beer once a week or once a month. They declared that they didn’t consumer medicines based on caffeine, and it has been verified that they use anti inflammatory, vitaminic complex, ferrous sulphate and supradyn in general between the athletes.

Nobody declared to be suffering from muscle damage or other damage that they can’t realize the tests in the maximum potential of each athlete. They know about all the testing procedures, through the consent term, which was read and signed by everyone.

**Ethical procedures**

This work was realized according to “Conduct of carrying researches in humans” resolution nº 196/96, National Council for Health 10/10/96 (BRAZIL, 1996). This research was subjected to
the review of COMEP – Research Ethics Committee, it involves human species at Castelo Branco University, in Rio de Janeiro, has been said favorable seem.

**Research Procedures**

Two maximum tests were realized in 3,200 meters at the same time in distinct days. The first day was realized exams about stature and body weight, interview and after this, the test. The break between the tests was about one week, which there was caffeine abstinence. In the second day of tests was realized consume of caffeine and waiting around one hour to begin the test and this substance has been metabolized.

**Preliminary Procedures**

**Nutritional Control**

All declared that during the interval among the tests, they maintained the abstinence of any food with caffeine, among them the chocolate and products like cocoa, açai, guarana powder, porangaba, black tea (mate, iced tea, energetic drinks), soft drinks with guarana, cola and caffeine. The abstinence of the referred substance was accomplished in this study due to the fact that in habitual consumers of 200mg/ day of caffeine 6mg/kg of the referred substance was supplied 1 hour before a race of 90 minutes in the treadmill to 70% VO2max it was not identified ergogenic effects, concluding that caffeine neutralizes the metabolic answers, eliminating their ergogenic effects (TARNOPOLSKY et al 1989).

**Checking up the climate condition**

The termohigrometro t2-18 was used for the temperature and the relative humidity of the air (RHA) before each one of the tests. The first was accomplished with a temperature of 29% and (RHA) of 64%. The second test was accomplished with a temperature of 27º and RHA of 71%.

**Evaluation of the corporal weight and stature**

**Evaluation of VO2max**

It was used the protocol of the Race’s test of 3,200 meters of RIBILS and KACHO DORIANO (Fernando Filho, 2003), valid for the evaluation of individuals groups with wide physical fitness level and many variable age group, because in the calculation formula of VO2max and it is taken into consideration the time spend in the accomplishment of the task (x1) in seconds, the age (x2), in year, and the corporal (x3) weight and kg being expressed in the following terms.

\[
VO2max (ml.kg^{-1}.min^{-1}) = 114,456.0,04689(x1) – 0,37817 (X2) - 0,15406 (X3)
\]

**Checking up training**

During the week, the trainings of the team were realized as foreseen by his technician, computing a total volume of 84.4km weekly in the morning (among show long distance, intervals and run continuous) and 21km weekly in the afternoon (run continuous).

**Caffeine’s Administration**

Caffeine was administered to the athletes, in the second day of tests, in the quantity of 5mg per kilo of corporal weight, in capsules, precisely in the values described above, in manipulation drugstore. The administration felt though the substance exercises a large ergogenic potential. On average, each athlete consumed 344,8mg of the analyzed substance, which is the same as a mug and a half 280ml of coffee. Together with caffeine, the medium amount of 20ml of Gatorade was ingested.

It was opted to administer the amount of 5mg per kilo of corporal weight. It has been verified the unanimous in all scientific articles analyzed and this is an amount moved away for the risk of doping (9mg/kg), however proved the ergogenic effect. When ingested...
in dosages of approximately 5mg/kg, 1:00h before the exercise, the caffeine exercises ergogenic benefits without reading values in the urinary concentration considered doping.

Significant differences were not verified among the dosages of 5,9 and 13mg/kg. However the last two exceeded the concentrations limits by IOC (International Olympic Committee) as doping (12mg/l of urine).

**PRESENTATION AN DISCUSSION OF DATA**

The data obtained during the tests can be observed the VO\(_{2}\text{max}\) and the time in seconds of the first test, without the caffeine uses (table2) and the second test, with the ingestion of caffeine (table 3).

The result of the sample’s group test of 3.200 meters without caffeine administration, presented a value of x = 616,92 + 56,82 seconds.

The result of the sample’s group test of 3.200 meters with caffeine administration, presented a value of x = 608,83 + 58,22 seconds. Observing the obtained data, it is noticed a difference in the average of the time and VO\(_{2}\text{max}\) between the two tests. The graphic 3 details the difference better in each subject and the graphic 4 VO\(_{2}\text{max}\).

It can be observed ,with the exception of the athletes 02, all of the athletes had an improvement in times between the first test (without caffeine) and the second test (with caffeine).

It can be observed that all of the athletes had an improvement in VO\(_{2}\text{max}\) between the first test (without caffeine) and the second tests ( with caffeine). In the statistical treatment of the obtained data, it was realized a statistic verifying correlation of coefficient “R”, the test “T” with degree of freedom (gl) 11 and a significance of p<0,05 (table4).

It was verified that 11 between 12 athletes obtained an improvement in the medium times of performance in the test of maximum race, in the distance of 3,200 (graphic 3), of the order of 0,13 + 0,1 min (8,08 + 6,01 seg), the group accomplished in the first test, the time of 10,28 + 0,95 min and in the second 10,15 + 0,97, presenting 1,33 + 1,01% of reduction in the time of the test of accomplishment (table 5)

However it analyses VO\(_{2}\text{max}\) (graphic 4) it is verified that there was an earn of 0,38 + 0,28 ml/kg/min, resulting in an improvement of 0,61 + 0,46%. Thus smaller variation of VO\(_{2}\text{max}\) in relation to the time of proof, is due, probably, to the difference presented in the relative humidity of the air (RHA) that varied in 7 points %. The significant of the air (RHA) that varied in 7 points %. The significant increase of (RHA) in the 21º test (71%) in relation to the 1º (64%) it can explain the variation in VO\(_{2}\text{max}\) not proportional to the improvement in the athletes medium time. The temperature in the 1º test was of 29,1ºC and in the second it was of 27ºC and it isn’t characterizing a difference that can be considered in the evaluation. Three between fifteen athletes, presented gastric discomfort, sweating, dizziness, earliness of vomit, after the ingestion of caffeine, it has been eliminated of the sample. It has been already eliminated some side effects, in those levels of dosages.

**CONCLUSION**

It was observed the medium time of performance with the caffeine use, after 1 week of abstinence of this substance, in 11 of the 121 evaluated subjects, in order of 8 seconds, some relevant treating of maximum tests. There was a significant improvement between the two tests of 3,200 meters realized, making possible the acceptance of the influence of the caffeine in the performance of the subjects. In that way, we concluded that the use of caffeine, after a week of abstinence, produces a significant ergogenic effect in the middle bottom proofs in the athletes’ performance, for medium times between 5 and 10 minutes. In the future studies, we emphasize the importance of the evaluation in race tests with duration over 60 minutes.

**REFERENCES**


Predominance effect of muscle fiber typo on the weight loss and on the aerobic conditioning training program

Abstract: The purpose of this study was to identify the effect of the aerobic conditioning increase (CA) and weight loss in people with predominant muscle fiber type and subsequently, to verify the correlation between the two variables. The sample was selected from 26 men divided into two groups (with ages varying from 19 to 22 years, and fat percentage from 13 to 25.22). The fat percentage Pollock 3-folds and VO2max. percentage (Cooper 12 minutes) of muscle fiber dermatoglyph was evaluated. The training period lasted for 12 weeks. Oxi group presented a fat percentage of (pre 16.05 ± 2.59 and post 12.63 ± 3.30) and VO2max. (pre 48.65 ± 3.74 and post 50.37 ± 3.56) and Glico group presented fat percentage (pre 17.42 ± 3.47 and post 14.94 ± 3.66) and VO2max. (pre 49.12 ± 3.70 and post 50.99 ± 4.01). The correlations for Oxi Group were (r= 0.913) for weigh loss and (r=0.91793716) for CA, and the correlation for Glico group were (r=0.932) for weigh loss and (r=0.373) for CA. When the two variables were correlated, OXI group presented a correlation of (r=0.497) with a significance of (amount – p = 0.024) and GLICO group of (r=0.229) and (amount – p = 0.056). Both groups presented a good correlation for weigh loss and only OXI group showed a good correlation for CA and a better correlation among the variables.

Keywords: Obesity, VO2, weigh loss, muscle fiber, Fatmax and dermatoglyph.

Correspondence to:
Submitted: May / 2004
Accepted: June / 2004
Efeito da predominância de tipo de fibra muscular sobre o emagrecimento e condicionamento aeróbico

O objetivo do trabalho foi identificar o efeito do aumento do condicionamento aeróbico (CA) e emagrecimento em pessoas com tipo de fibra muscular predominante e verificar a correlação entre as duas variáveis. A amostra apresentou 26 indivíduos homens separados em 2 grupos (idade 19-22 anos, % gordura 13-25,22). Foram avaliados percentual de gordura, (Pollack 3 dobras) VO2máx. (Cooper 12 minutos) e o percentual de fibra muscular (dermatoglifia). O treinamento foi realizado durante 12 semanas. O grupo Oxi apresentou percentual de gordura (pré 16,05±2,59 e pós 12,63±3,30) e o VO2máx. (pré 48,65±3,74 e pós 50,37±3,56) e o grupo Glico com percentual de gordura (pré 14,94±3,47 e pós 12,63±3,30) e o VO2máx. (pré 49,12±3,70 e pós 50,49±4,01). O grupo Oxi apresentou uma correlação entre o emagrecimento (r=0,91362327) e o CA (r=0,91793716) enquanto o grupo Glico apresentou uma correlação (r=0,93288722) e C.A (r=0,91793716). O grupo Oxí representou porcentagem de gordura (antes 16,05±2,59 e depois 12,63±3,30) e o percentual de fibra muscular (Dermatoglifia). El entrenamiento duró 12 semanas, el grupo Oxi presentó porcentaje de gordura (antes 16,05 + 2,59 y después 12,63 ± 3,30), porcentaje de fibra muscular (Dermatoglifia): El entrenamiento duró 12 semanas, el grupo Oxi presentó y el grupo Glico presentó.


INTRODUCTION

Due to the problem of obesity, many studies are conducted to tailor the physical training to obtain a lower percentage of fat. One such study involves research on the fatmax indicator from greater consumption of fat (fatty acids) in the aerobic training, and to 64 ± 4 VO2máx. Or 74 ± 3% HR max. While the area of fatmax is between 55 ± 3 to 72 ± 4% VO2máx. Or 68 ± 3 to 79 ± 3% FCmáx. (JEUENDRUP; ACHTEN, 2001).

When it comes to maximum oxygen consumption can be observed through the study of Ivy et al (1980) that the type of muscle fiber oxidative showed correlation with the VO2máx. In the study, Flynn et al (1987) observed that athletes from triathlon, which is a sport of endurance, a higher percentage of oxidative fiber. The oxidative fibers, by submitting their system more adapted for the use of fat, have a negative result when related to obesity (HELGE et al, 1999; TANNER, 2002). The objective of the study was to identify the effect of increasing the aerobic conditioning and weight loss in people with type of muscle fiber predominant and then check the correlation between the two variables of the limits described above and do not present state of health favorable and / or dermatoglyphic Arc (A) draw.

After using the criterion of inclusion and exclusion, we got a group of 26 subjects (n = 26) who were separated by groups of predominance of muscle fiber: for predominance of oxidative muscle fiber (n = 11), called OXI group and by predominance of glycolytic muscle fiber (n = 15), called Glico group. The type of fiber was assessed by the dermatoglyphic method (Cummins and MIDLO, 1945 apud FERNANDES FILHO, 1997).

The training of race in the area of intensity of Fatmax was held for 12 weeks, with 40 minutes each training three times a week. From first to fourth week, the intensity was 55% of VO2máx. , the fifth to eighth weeks, 66% of VO2máx. , and the ninth to twelfth week, 72% of VO2máx. .

The body composition was performed through the skin folds by the method of three folds (and JACKSON POLLOCK, 1978) and the maximum consumption of oxygen was obtained through the test of 12 minutes, Cooper (COOPER, 1968).

The material used for the analysis of dermatoglyph was the collector’s mark Impress (Brazil) and white A4 size paper. The evaluation of skinfolds was realised by the unit CESCORF Scientific (Brazil), which present a constant pressure of 10g/mm2 in any opening and present a pressure-measuring 0,1 mm. So the maximum consumption of oxygen was used an official athletics’ track (400 m).

METHODOLOGY

The population of 396 cadets of the second year of MAAN (Military Academy of Agulhas Negras). Taking as a criterion for subject inclusion MAAN of the second year, with percentage of fat equal to or greater than 13%, aged 19 and 22 years and that present state of health favorable, as a criterion for exclusion, AMAN subject of the second year, with percentage of fat less than 13%, aged out or greater than 13%, aged 19 and 22 years and that present state of health favorable, as a criterion for exclusion, AMAN subject of the second year, with percentage of fat less than 13%, aged out of health favorable, as a criterion for exclusion, AMAN subject of the second year, with percentage of fat equal to 13-25,22). Foram avaliados percentual de gordura, (Pollack 3 dobras) VO2máx. (Cooper-12 minutos) e o percentual de fibra muscular (dermatoglifia). O treinamento foi realizado durante 12 semanas. O grupo Oxi apresentou percentual de gordura (pré 16,05±2,59 e pós 12,63±3,30) e o VO2máx. (pré 48,65±3,74 e pós 50,37±3,56) e o grupo Glico com percentual de gordura (pré 14,94±3,47 e pós 12,63±3,30) e o VO2máx. (pré 49,12±3,70 e pós 50,49±4,01). O grupo Oxi apresentou uma correlação entre o emagrecimento (r=0,91362327) e o CA (r=0,91793716) enquanto o grupo Glico apresentou uma correlação (r=0,93288722) e C.A (r=0,91793716). O grupo Oxí presentó porcentaje de gordura (antes 16,05 + 2,59 y después 12,63 ± 3,30), porcentaje de fibra muscular (Dermatoglifia).

The method of collection called dermatoglyph detects the fingerprints and conducts their processing. Cummins and Midlo (1945) explain this protocol as follows: for obtaining fingerprints are used paper and a specific collector. In the procedure for obtaining fingerprints of the fingers, the fingers should be washed well previously, so that the entire surface to be printed cover with a layer of regular paint. The distal phalanges have to be covered with paint on the side of valar surface and the side until the nails. In addition, to be more complete the printing of the distal phalanges, you must press the nail, with all due care, without moving, turning the finger at the same time. In this case are presented three designs: the Arc (A), drawing with no deltas which are featuring the absence of triradios or deltas, the Presilha (L), represented by a delta design (it is a closed design means that the crests of the skin starts from the extreme finger, incurves in relation to the other, without to be closer where it starts. This design represents the glycolytic muscle fiber), and Verticilo (W) designs represented by two deltas. This last one is a closed figure, where the central lines are concentrated around the core of the design. This design represents the oxidative muscle fiber.

The descriptive statistical analysis was performed after the division of the groups to obtain the average standard deviation in each group separately.

The evolution of each variable between pre and pos test was represented in graphical form, favoring the monitoring of changes between the moment.

The statistical inference was the test of Estimate of the Pearson’s Correlation, with the purpose of investigating the correlation of pre and pos test and the relation between pairs of variables percentage of fat and aerobic conditioning of groups of OXI and GLYCO.

The measuring tests’ objective of this work is guided with basic considerations of statistical treatment in order to maintain the scientific research, considering the significance level of value p < 0.05, that is, 95.00 % of Probability for the affirmative and / or negative denoted during investigations.

### RESULT

The predominance of the muscle fiber type was examined by dermatoglyph which the groups were separated. Table 1 shows average and standard deviation of the designs dermatoglyphics and the muscle fiber type group with the predominance of fiber oxidative (OXI).

The number of Presilha corresponds to the Glycolytic type of muscle fiber and the number of Verticilo corresponds to the type of muscle fiber. People who have dermatoglyphic drawing Arc do not come from the sample part because they do not have any relation with the two types of muscle fiber (FERNANDES FILHO et al, 2003).

As described above, we can see that the group presents a percentage of 73.64% of oxidative fiber.

Table 2 presents dermatoglyphic drawings and muscle fiber type group with the predominance of fiber glycolytic (GLYCO).

As described above, we can see that the group presents a percentage of 75.33% of glycolytic fiber.

The weight loss seen in graphic 1 by the group showed GLYCO presents reduction of 17.42% body fat to 14.94%, with a difference of 14.24%, which means (p = 0.00 <0.05). The VO2\text{max} \text{,} \text{ passed to } 49.12 \text{ ml (kg.min)}^{-1} \text{ to } 50.99 \text{ ml (kg.min)}^{-1}, \text{ showing a difference of } 3.81\% \text{, seen in graphic 1, which means (p = 0.01 < 0.05),}

The weight loss seen in graphic 2 by the group OXI presented reduction of 16.05% of body fat to 13.61%, with a difference of 15.20, which means (p = 0.00 <0.05). The VO2\text{max} \text{,} \text{ passed to } 48.65 \text{ ml (kg.min)}^{-1} \text{ to } 50.37 \text{ ml (kg.min)}^{-1}, \text{ showing a difference of } 3.54\% \text{, which means (p = 0.06 > 0.05).}

Table 4 are presented the results of the correlation of Pearson to VO2\text{max} - .

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arc (A)</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Persilha (L)</td>
<td>2.73</td>
<td>1.19</td>
</tr>
<tr>
<td>Verticilo (W)</td>
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<td>1.19</td>
</tr>
<tr>
<td>Glycolytic (%)</td>
<td>26.36</td>
<td>11.20</td>
</tr>
<tr>
<td>Oxidative (%)</td>
<td>73.64</td>
<td>11.20</td>
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<table>
<thead>
<tr>
<th>Statistic</th>
<th>Average</th>
<th>SD</th>
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<tbody>
<tr>
<td>Arc (A)</td>
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<td>0.00</td>
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<tr>
<td>Persilha (L)</td>
<td>7.53</td>
<td>1.55</td>
</tr>
<tr>
<td>Verticilo (W)</td>
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<td>1.55</td>
</tr>
<tr>
<td>Glycolytic (%)</td>
<td>75.33</td>
<td>15.52</td>
</tr>
<tr>
<td>Oxidative (%)</td>
<td>24.67</td>
<td>15.52</td>
</tr>
</tbody>
</table>

**Arco “A”**  
Presilha “L”  
Verticillo “W”  

**Picture 1 - Dermatoglyphic Drawing**
We can see that the OXY group presented a good correlation between the pre and pos test, showing that the group as a whole increase in aerobic conditioning, which did not occur with the group GLYCO, which has a low correlation between the pre and post test. From this last affirmative, we can suggest that subjects with loss of CA.

Table 5 are presented the results of the Pearson correlation to the percentage of fat.

In table 5 we can notice that the two groups have good correlation to loss of fat percentage. Table 6 are presented the results of the Pearson correlation to the differences in CA and fat percentage.

It can notice with the result above that the correlation between the variation of CA and the loss of Percentage of fat in the OXI group was -0.4976878, demonstrating a low relation between the differences of variables. However, this presented as the only significant estimate (p-value = 0.0024), while for the GLYCO groups, the estimate of correlation was -0.22968847. So this result is not significant (p-value = 0.056).

**DISCUSSION**

Comparing the results above, we can see that between the two groups which presented lost of the percentage of fat in relation to the increase in aerobic conditioning was the OXI group. Comparing the results with the literature, we can see that the group that sets easier to reduce its percentage of fat in relation to aerobic conditioning is the group that presents the greatest number of oxidative fibers. The group with predominance of oxidative fiber presents greater facility to use the fat as an energy source. The study by Kern et al (1999) had obese individuals to verify the effect of weight loss, with training for three months, obtaining an increase and the ability of oxidation in all types of muscle fibers, but with even greater proportion in oxidative fibers. This study shows that the group that presents the type of fiber oxidative has increased metabolic characteristics, facilitating the oxidation of fat and getting a better result in the loss of percentage of fat in relation to the other groups. This theory is confirmed by the study of Carte et al (2001), which shows that the training of endurance increases the oxidative muscle capacity. Dantas (2003) puts that aerobic training, increases oxidative capacity of all muscle fibers, but with a significantly greater increase of oxidative fibers on the fibers glycolic.

Helge et al (1999) and Tanner et al (2002) observed that the result shows that people with muscle fiber type 1 have no relation to obesity because they have facility to use the fat as substrate energetic and greatest facility in reducing body fat. Another study noted that the group that had dominated the fiber IIB had a greater predisposition to the accumulation of fat (HOUHARD, 2001).

The studies above corroborate the group to conclude that Oxy has a best result of the loss of percentage of fat through aerobic conditioning to display greater ease of use of fat as energy substrate.

The same group also showed a high correlation to the gain of aerobic conditioning. McArdle et al (1998) puts the muscle fiber has increased oxidative capacity of aerobic activities, and gain better results in the area where trained aerobic. Bouchard et al (1992) apud Wilmore and Costill (2001) cited that the VO2 max, an individual has genetic characteristics, showing that people with dominance of oxidative fibers have better result in gain from it. It was observed in relation to the results of table 4, which show won the group OXI between the pre and pos test.

The result of GLYCO group, which didn’t present relation between percentage of fat and aerobic conditioning, indicated a decrease in the percentage of fat in the pos test. This result may be related to training that cadets realize called military physical training (MPT). The MPT gives a high intensity and can be correlated with the group GLYCO by the predominance of glycolytic fiber, with adaptation to this fiber. Pette (1980) apud Powers and Howley (2000) put that fiber, rich glycolytic enzymes that show a great anaerobic capacity where the glycogen

<table>
<thead>
<tr>
<th>Graphic 1 - Pre-test and pos-test the percentage of fat and VO2_max of Glyco group.</th>
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<table>
<thead>
<tr>
<th>% Gordura</th>
<th>VO2 Máx</th>
</tr>
</thead>
<tbody>
<tr>
<td>17,42</td>
<td>49,12</td>
</tr>
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<td>14,94</td>
<td>50,99</td>
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<table>
<thead>
<tr>
<th>Graphic 2 - Pre-test and post-test the percentage of fat and VO2_max of Oxy group.</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>% Gordura</th>
<th>VO2 Máx</th>
</tr>
</thead>
<tbody>
<tr>
<td>16,05</td>
<td>48,65</td>
</tr>
<tr>
<td>13,61</td>
<td>50,37</td>
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</table>
is the best source of energy used by the group. Wilmore and Costill (1994) consider that the intense exercises present a total calorie expenditure. It is greater than exercises of low intensity. We can consider, observing the results above, the group Glyco decreased the percentage of fat on grounds of total caloric expenditure, and not according to the increase in aerobic conditioning.

From the studies made by Suzuki (1979), he noted that the types of muscle fibers oxidative and glycolytic would answer the training in a bicycle with two types of rpm, came to the conclusion that, if used more rpm (100 rpm), The group presents better glycolytic efficiency because it obtains more glycolytic energy source and, consequently, can have great results with higher intensities. It is important to note that the highest intensity difficult the use of fat as energy substrate for the activity realized.

CONCLUSION

We can conclude, initially, that both the group OXI as the group GLYCO have a positive result in relation to weight loss, which does not occur with aerobic conditioning, where the OXI group presented a higher result than the group GLYCO, showing that the type of fiber muscle can be a differential factor.

When it does the correlation between two variables, the best result is the OXI group, showing that the dominance of oxidative type of muscle fiber was the determining factor for the differences between the results observed in the study.

It is recommended that future studies be made into different people, show the greatest percentage of fat and which have no other parallel physical activities to the study.

Table 6 – Pearson’s correlation between the VO2max⁰ and percentage of fat in groups

<table>
<thead>
<tr>
<th>CA and G%</th>
<th>Oxy</th>
<th>Glyco</th>
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<tbody>
<tr>
<td>Oxy</td>
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</tr>
<tr>
<td>Glyco</td>
<td>-0.22968847</td>
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REFERENCES


