INTRODUCTION
The cardiovascular system is strongly influenced by thyroid hormone action. According to Dillman (1990), the deficiency of these hormones may change the myocardial function, reducing the activity of the enzymes involved in the regulation of calcium fluidity to myocytes and in the expression of contractible proteins.

Subclinical hypothyroidism (SH) is defined as a condition in which the levels of TSH thyrothrophine are elevated, associated to normal levels of the thyroid hormones T4 (thyroxine) and T3 (triiodothyronine) and their respective free functions (KAHALY; DILLMANN, 2005). Although the term “subclinical” is used in order to elucidate that this is a disease essentially based upon changing’s of biochemistry order, literature reveals, more and more, the presence of evidences and symptoms of Overt Hypothyroidism (OH) in patients with HS (RODONDI et al., 2005).

Biondi et al. (2002) revised the effects of HS in cardiovascular system and mentioned, among others, the enlargement of the pre-ejection period and of the vascular periferic resistance and the diminution of the contraction of myocardial, of cardiac output, and the fraction of ejection in effort. Besides, Rodondi et al. (2006) certified in a study of metanalyses, an association between SH and the enlargement of risk of development of coronarian disease.

Considering the possibility of occurrence of changings in cardiovascular response in this group of patients, this study aims to evaluate the heart rate (HR) response in the three first minutes of exercise-recovery, before and after six months of recovering from the euthyroidism condition, through replacement with levothyroxine.

MATERIALS AND METHODS

Sample
Seventeen inactive women aged between 31 and 54 years have participated voluntarily of this study, that presented two dosages of TSH above the superior limit of normality (4.0 mUl/l), with a minimum interval of four weeks, associated to normal levels of T4 I (0.8-1.9 ng/dL). At least one dosage was accomplished at the Laboratory of Clinical Pathology / Section of Hormones of Clementino Fraga Filho Hospital of Federal University of Rio de Janeiro (HUCFF/UFRJ). The patients were divided randomly into two groups: treatment with levothyroxine (n=9) and observation (n=8).

The following criterions of exclusion were adopted to the participation in the study: the using of drugs and substances that interfere in thyroid function, the presence of diseases, even the steady ones that may change the circulating levels of thyroid hormones and previous replacement with levothyroxine.

Protocol
Patients were led to the Laboratory of Physiology of Exercise of EEFD- UFRJ, were the evaluation of cardiopulmonary capacity took place through ergospirometry. In this case, it was used a treadmill (ECAFIX EG 700.2), and it was adopted the Modified Balke’s protocol. The electrocardiographics evidences (Medical Diagnostic Workstation (MDW) - Cardio Control 2000/2001) were processed in real time. The values of heart rate (HR; bpm) observed in the first, second and third minutes of exercise-recovery were considered in the analyses.

The interruption of the test occurred for the asking of the patient or because of the apparition of symptoms that could prevent its proceeding and/or could represent risk to the patient. The line of direction of American College of Sports Medicine (ACSM, 2003) was observed to the control of limiting symptoms. Patients were evaluated in two moments: basal and after a six month intervention (replacement with levothyroxine), or observation.

Ethical Committee
This study was approved by the Ethical Committee of HUCFF/ UFRJ. All subjects gave their written consent and the protocol was approved by the local ethics committee.

Statistical Analysis
Results were expressed trough descriptive measures (mean ± standard-deviation). It was used the Mann-Whitney test to compare the mean values inter groups and to the comparison intra groups after 6 months of intervention or observation it was used the Wilcoxon test. The level of significance adopted was of 5% and the statistical treatment was accomplished in the software SPSS13.0 for Windows.

RESULTS
The groups showed comparable concerning the variables smoking and the menopause presence (chi-square test; p 0,05). Differences statically significant as for variables ageing, weight and Body Mass Index (BMI) were not observed.

Table 1 - Mean values (± standard-deviation) of the general characteristics of the sample

<table>
<thead>
<tr>
<th>Variables</th>
<th>Treatment (n = 9)</th>
<th>Observation (n = 8)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>43,1 ± 6,6</td>
<td>45,5 ± 5,6</td>
<td>0,47</td>
</tr>
<tr>
<td>TSH (mUl/l)</td>
<td>8,0 ± 2,6</td>
<td>7,3 ± 1,9</td>
<td>0,67</td>
</tr>
<tr>
<td>T4L (ng/dl)</td>
<td>1,1 ± 0,2</td>
<td>1,0 ± 0,3</td>
<td>0,67</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>71,0 ± 14,5</td>
<td>65,3 ± 11,3</td>
<td>0,39</td>
</tr>
<tr>
<td>BMI (m/kg²)</td>
<td>28,3 ± 5,2</td>
<td>25,2 ± 2,9</td>
<td>0,85</td>
</tr>
<tr>
<td>Menopause (yes; %)</td>
<td>29,4</td>
<td>33,3</td>
<td>0,49</td>
</tr>
<tr>
<td>Smoking (yes; %)</td>
<td>11,8</td>
<td>22,2</td>
<td>0,92</td>
</tr>
</tbody>
</table>
Concerning HR and considering the observed results in initial analyses (basal), it was observed that behavior of this variable in the three first moments of recovering considered in the study, showed similar between groups, without the evidence of significant statistically differences (Table 2). However, when the results were observed after six months of intervention or observation, it was noticed that the group that had received replacement of levothyroxine presented reduction of FC in all considered moments of recovering, especially at the first minute, while the group of observation maintained similar average values, accordingly to Table 3.

**Table 2 - Mean values (± standard deviation) of heart rate (bpm) in the first, second and third minutes of exercise-recovery - Basal Evaluation - Treatment and Observation Groups**

<table>
<thead>
<tr>
<th>Time (minute)</th>
<th>Treatment (n = 9)</th>
<th>Observation (n = 8)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>128.0 ± 22.9</td>
<td>127.9 ± 12.5</td>
<td>0.81</td>
</tr>
<tr>
<td>Second</td>
<td>114.4 ± 15.2</td>
<td>114.4 ± 17.6</td>
<td>0.50</td>
</tr>
<tr>
<td>Third</td>
<td>110.8 ± 13.4</td>
<td>109.1 ± 15.1</td>
<td>0.81</td>
</tr>
</tbody>
</table>

**Table 3 - Mean values (± standard deviation) of heart rate (bpm) in the first, second and third minutes of exercise-recovery - Basal Evaluation and 6 months of treatment or observation - Treatment and Observation Groups**

<table>
<thead>
<tr>
<th>Basal</th>
<th>6 months</th>
<th>p-value</th>
<th>Basal</th>
<th>6 months</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>128.0 ± 22.9</td>
<td>117.0 ± 17.5</td>
<td>0.06</td>
<td>127.9 ± 12.5</td>
<td>129.0 ± 19.8</td>
</tr>
<tr>
<td>Second</td>
<td>114.4 ± 15.2</td>
<td>107.0 ± 14.4</td>
<td>0.14</td>
<td>114.4 ± 10.7</td>
<td>113.6 ± 17.6</td>
</tr>
<tr>
<td>Third</td>
<td>110.8 ± 13.4</td>
<td>105.7 ± 12.8</td>
<td>0.23</td>
<td>109.1 ± 12.8</td>
<td>110.1 ± 18.7</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The recovering of FC after vigorous effort is a recognized indicator as an important predictor of morbidities and mortalities, above all, those associated to cardiovascular system (Nilsson et al., 2007). An inefficient recovering (slower) indicates a diminished answer of cardiovascular system and autonomous nervous system after effort especially of parasympathetic activity (Kizilbash et al., 2006).

Literature registers that individuals with HS may present deteriorations in their cardiovascular system such as the enlargement of the pre-ejection period and of peripheral vascular resistance as well as the diminishing of contractibility of the myocardium (Biondi et al., 2002). However, studies have demonstrated that the treatment with replacement of levothyroxine may cause positive effects in the improvement and in the control of them and other evidences and symptoms characteristic of HS (Monzani et al., 2001).

Up to this moment, there were not found studies that examined the effect of the treatment with replacement of levothyroxine in the recovering of FC after effort. Thus, our results suggest that levothyroxine, as well as in the other cardiovascular parameters investigated in the literature, seems perform, too, a positive effect in this indicator.

It is relevant to add that, although significative statistic differences may have not been found, the results observed in this work have a great clinical relevance since the individuals under treatment presented lower values of FC after 6 months of euthyroidism condition.

**CONCLUSION**

In the present study, the treatment with replacement of levothyroxine seems to have been favorable to improvements in the recovering of FC response after effort in patients with HS after 6 months of euthyroidism condition, with important influence in the first minutes after effort.

**REFERENCES**


Kizilbash et al., 2006.


Nilsson et al., 2007.


Rodondi et al., 2007.

Heart recovery is more strongly associated with the metabolic syndrome, waist circumference, and insulin sensitivity in women than in men among the elderly in the general population. American Heart Journal, v.154, n.3, p.460.e2 - 460.e7, 2007.

Growdon et al., 2000.

Heart recovery is more strongly associated with the metabolic syndrome, waist circumference, and insulin sensitivity in women than in men among the elderly in the general population. American Heart Journal, v.154, n.3, p.460.e2 - 460.e7, 2007.


Nilsson et al., 2007.

**SUBMAXIMAL EXERCISE-RECOVERY CHRONOTROPIC RESPONSE OF SUBCLINICAL HYPOTHYROIDISM PATIENTS TREATED WITH LEVOTHYROXINE**

**ABSTRACT**

Subclinical hypothyroidism (SH) is defined as a condition in which the levels of (TSH) thyrothropine are elevated, associated to normal levels of the thyroid hormones T4 (thyroxine) and T3 (triiodothyronine) and their respective free functions.
Although many studies about these patients group are done, little is known about exercise-recovery heart rate (HR). Objective: Considering the possibility of occurrence of changes in cardiovascular response in this group of patients, this study aims to evaluate the heart rate (HR) response in the three first minutes of exercise-recovery, before and after six months of recovering from the euthyroidism condition, through replacement with levothyroxine. Methods: A total of 17 patients was randomly divided into two groups: treatment (n=9; 43,1 ± 6,6 years) and observation (n=8; 45,5 ± 6,6 years). Patients were submitted to a cardiopulmonary test, performed in a treadmill, using Modified Balke’s protocol, in two moments: basal and after six months of treatment or observation. It was used the Mann-Whitney test to compare the mean values inter groups and to the comparison intra groups after 6 months of intervention or observation it was used the Wilcoxon test (p=0,05). Results: Both groups presented similar mean HR values in the first evaluation. However, when we analyzed results after six months of intervention or observation, we observed that the group that received levothyroxine presented lower values of HR in all minutes of exercise-recovery considered in the present study. The observation group maintained the same mean values of HR. Conclusion: Patients treated with levothyroxine presented a better HR exercise-recovery, especially during HR exercise minute.

KEY-WORDS: Subclinical hypothyroidism, Heart Rate and Levothyroxine