The possible decrease on aerobic performance in soccer athletes from 14 to 15 years old, caused by mouth breath

ABSTRACT: This research aims to compare the aerobic capacity of soccer athletes, from 14 to 15 years old. The athletes were divided in two groups, the Mouth Breathers and the Nasal Breathers, after a orthodontic analysis. After these evaluations, the athletes had participated in a test of field of 2,400 meters, used for calculate the Maximum VO₂. The sample was constituted of 7 Mouth Breathers athletes and 7 Nasal Breathers, with Mesomorphic predominance in both the groups. The results of the test had been analyzed through descriptive statistics, which pointed out an average (x) and shunting line standard (DP) of 42.14 for an esteemed Maximum VO₂ of ± 1.99 ml (kg.min)-1 for Mouth Breathers, and of 44.39 ± 2.47 ml (kg.min)-1 (X ± DP) for Nasal Breathers. These results had been evaluated according to test t of Student, which presented the value of 0.08, concluding that the difference was not statistically significant; however, it should be remembered that small differences, when we are talking of high performances, could really makedifference. Thus, it is advisable that new studies should be made, using more direct tests, with greater control of variables and considering different age groups, in order to verify if Mouth Breath can really affect the Aerobic performance.

Keywords: mouth breath, Maximum VO₂, somatotype, ATM.
INTRODUCTION

What do the teeth have to do with the sports? That question, mainly for the lay ones, seems not to have any sense. However, it is known that the dental problems have great influence in the athletes’ performance, could bring great damages to their performance in the sports. Those problems don’t only devastate the athletes and their acting, but any individual, could disturb in their daily tasks.

Among all of the problems types involving the buccal health that reach the men, that study stopped in evidences found about the Buccal Breathing. Evidences those, as mentioned by Di Francesco (1999), that affirm that the Buccal Breathing, for not promoting a preparation of the inspired air, takes to the modification of the lung mechanisms of absorption of gases, elevation of the resistance of the aerial ways and decrease of the lung indulgence, reducing the use of O₂ not only in the rest, but mainly in the exercise. Other problems caused by the Buccal Breathing by dysfunction of TMJ are the postural problems, as tells Messerman (1988, apud CORADONA and ALVES 1997); as that author, some postural problems can be interlinked to the oral cavity. Souza (2004), tells that the most common damages can be the bad use of the foods for the mastication deficiency and digestion, lesions, bad recovery of those lesions, decrease of the aerobic capacity and precocious fatigue.

Those evidences show the importance that should be given to the problem. As example, we have Ronaldinho, which almost abandoned the soccer due to dental problems at the fifteen years old, which impeded that he accompanied the other boys’ physical performance. Like this, it could had a talent waste for lack of the trainers’ information. In agreement with Gomes, (2002), many trainers forget that the main objective of the juvenile sports is the formation of favorable conditions for the reach of good results in the ideal age for each sport, not the momentary performance.

Frejman (2000) tells that the man was programmed to nose breathe, however some factors can modify that, causing a Mixed or Buccal breathing. Those modifications in the breathing pattern can be classified in the following way: (a) Organic Buccal Breathing: caused by the mechanical nasal obstruction, retronasal and buccal; (b) Functional Buccal Breathing: caused by the addiction of mouth breathing, even doesn’t having any obstruction type; (c) Impotent Functional Buccal Breathing: caused by some neurological dysfunction, usually those individuals have psychiatric problems. Frejman (2000) also tells that permanence of Buccal Breathing that worsens the breathing mechanics could unbalance the thoracic and postural musculature. That bad posture commits the breathing because the shoulders are anteriorized, causing a hypercifosis, that compresses the thorax, reduces the thoracic internal space and, consequently, hinders the breathing. According to Marchesan (2001) the main characteristics of the Buccal Breathers are anteriorized shoulders, hypercifosis, hyperlordosis, thoracic asymmetry, salient scapula, facial musculature flabbiness, they can present bad dental occlusion, allergic and other rhinitis. Another example mentioned by Powers and Howley (2000) is the fact that IVAS (infections of the superior aerial ways) can increase in athletes of high level, harming the air reception, however, in moderate physical trainings, that problem doesn’t exist. (OLIVEIRA, 2005). Vig et al, (1980, apud OLIVEIRA, 2005) demonstrated, in an experimental study, that the head’s posture is dependent of...
the breathing pattern. Hellings (1989, apud OLIVEIRA, 2005) confirmed the positive relationship between the nasal obstruction and head extension. Marchesan (2001) affirms that the united work, that it has already been accomplished in the last decade in a systematized way, has shown much more efficient in the treatment of those dysfunctions. Marchesan (2001) also says that it is worth to remind, that neither all these alterations will be present in a same patient.

In agreement with Bricot (1999), the works done for all those years take us to think in the postural system as a whole. And according to Coradona and Alves (1997), cannot have an only vision about the organism factors, we needed to understand that their characteristics are fruit of multiplicative and differentiated processes. That takes to the conclusion that, according to Maciel et al. (2003), an intimate relationship exists between posture and Temporomandibular Joint (TMJ), the articulation that the skull links with the jaw. It can seem that this articulation doesn’t have great function and influence in our organism, however that is not true, TMJ has a great relationship with the posture, mastication, deglutination, breathing, etc. Therefore, a dysfunction in that structure cannot only impede the high performance of athletes, as well as to take to health problems. That dysfunction type, call of Temporomandibular Dysfunction (TMD), can take the individual becoming a Buccal Breather or vice-versa. Therefore, the study and understanding of that structure is of great importance for that research and, according to American Academy of Pediatric Dentistry (1990, apud SORIEVO 1997), those TMJ dysfunctions doesn’t have a defined aetiology, being believed that functional, structural and psychological factors are linked to it and that several types of treatments can be used, as therapies, massages, apparels and other, depending on the otorhinolaryngology. As treatment example, Boni et al. (1997) ended that the removal of habits of pacifier suction or feeding bottle in children from 4 to 6 years old through understanding and positive reinforcement was shown very effective during the period from 34 to 54 days, could reduce the TMD dysfunctions. Francesqueine (1998) detaches that the physiotherapy is also a treatment example for the TMJ dysfunctions that reaches 20% of the adult population, also tells that the apparels and physiotherapeutic techniques are of great usefulness in the treatment of those problems.

The dysfunction of that structure is so common that, in agreement with the researches of Egermark and Eriksson et al. (1981 apud SORIEVO 1997) in 402 children of 7, 11, 15 years old, it was observed that 39%, 67%, 74%, respectively, presented TMJ dysfunction symptoms. Researches as those show that dysfunction incidence, that is one of that causes buccal breathing and postural problems. The TMJ dysfunctions can still bring other problems, as found by Bianchini (1999), that verified pain to the hand mani-
tion and that their actions can be improved through observation, analysis and description. The method of the descriptive research will be normative, because according to Thomas and Nelson (2002), it is a study in that there is a results comparison of the phenomenon in function of the pre-established conditions.

The subjects of the research were soccer athletes in the age group from 14 to 15 years old, male, with at least 2 years of training. Will participate in the study two groups of 7 athletes: a group that presents Buccal Breathing and other, Nasal Breathing. To participate in the research all the participants had to present medical evaluation proof of the buccal breathing or not, to have at least 2 years of training, to be in the age group from 14 to 15 years old and being of the masculine gender. The study will be a comparison among the two groups that will go by the Orthodontist analysis to detect the buccal Breathing and the TMJ Dysfunction, a field test of 2400 meters for the calculation of esteemed Maximum VO₂ and a Somatotype collection, seeking with those data to explain the found results.

The evaluation was divided in parts: firstly it was made a decision by an Orthodontist to detect the existence or not of Buccal Breathing and TMJ Dysfunction, making possible, like this, the athletes’ division in two groups: Buccal Breather Group and Nasal Breather Group. After that classification, the athletes participated in a data collection for the Somatotype analysis and a field test of 2400 meters to calculate esteemed Maximum VO₂. However it is necessary to stand out that it was not made an analysis by an otorrinolaringologist, fonoaudiologist, physiotherapist for best to detect the Buccal Breathing, and also Maximum VO₂ was checked through an indirect test, could have certain error margin.

As for the statistical treatment to be used, were used, fundamentally, the descriptive statistics methods in the sense of characterizing the sampling universe, under their aspects of frequency distribution, when treats of mean and discreet data, pattern deviation, variances and other pertinent statistics, when treats of continuous data. The comparison statistics will be used, in analysis for the student T test. As complemental Post-Hoc test, the Scheffe test will be used, through which identifies of combinatory and comparative way, where can happen, the possible differences manifested by the Student T test, with level of considered significance of p < 0.05, that is, 95% of certainty for the affirmatives and/or negatives that the present study comes to present.

### PRESENTATION AND DISCUSSION

The results obtained in this research will be described and discussed. The research was accomplished with soccer athletes of the Campos of Goytacazes city, where an analysis of esteemed Maximum VO₂ of two groups of 7 (seven) soccer athletes was developed in the age group from 14 to 15 years old after an Orthodontic analysis for the classification of the groups in Buccal Breather or Nasal Breather, trying like this to discover the Buccal Breathing can Influence in those athletes’ aerobic performance. It will also be presented and discussed the Somatotype of the two groups, trying to have one more information for analysis and results discussion.

The evaluations and tests were made in evening schedules, for 30 (thirty) days, in the two athletes groups, being appraised 5 (five) athletes per time. Starting from the obtained results, esteemed Maximum VO₂ was calculated through the test of 2400 meters.

### Table 1 - Presentation of the results of the test of 2400 meters and of the athletes’ Buccal Breathers Somatotype

<table>
<thead>
<tr>
<th>Buccal Breathers</th>
<th>T.min</th>
<th>T.sec</th>
<th>VO₂max</th>
<th>ENDO</th>
<th>MESO</th>
<th>ECTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athlete 1 side back</td>
<td>10.45</td>
<td>627</td>
<td>45.94</td>
<td>1.68</td>
<td>4.04</td>
<td>2.86</td>
</tr>
<tr>
<td>Athlete 2 midfielder</td>
<td>11.3</td>
<td>678</td>
<td>42.48</td>
<td>2.66</td>
<td>5.62</td>
<td>1.79</td>
</tr>
<tr>
<td>Athlete 3 midfielder</td>
<td>11.32</td>
<td>679.2</td>
<td>42.41</td>
<td>1.59</td>
<td>2.85</td>
<td>3.39</td>
</tr>
<tr>
<td>Athlete 4 forward</td>
<td>11.45</td>
<td>687</td>
<td>41.93</td>
<td>3.15</td>
<td>3.9</td>
<td>3.53</td>
</tr>
<tr>
<td>Athlete 5 full back</td>
<td>11.57</td>
<td>694.2</td>
<td>41.49</td>
<td>1.97</td>
<td>2.78</td>
<td>3.28</td>
</tr>
<tr>
<td>Athlete 6 midfielder</td>
<td>11.58</td>
<td>694.8</td>
<td>41.46</td>
<td>4.72</td>
<td>4.24</td>
<td>1.59</td>
</tr>
<tr>
<td>Athlete 7 forward</td>
<td>12.22</td>
<td>733.2</td>
<td>39.28</td>
<td>2.36</td>
<td>3.82</td>
<td>3.18</td>
</tr>
</tbody>
</table>

The first column describes the position of the athletes in game; the second column describes the time in minutes (T.min); the third column, the time in seconds (T.sec); the fourth column, VO₂max; the fifth column presents Endomorphia (ENDO); the sixth column shows the values of Mesomorphia (MESO); and the seventh column the results of Ectomorphia (ECTO) of the group in subject.

### Table 2 - Presentation of the results of the test of 2400 meters and of the athletes’ Nasal Breathers Somatotype

<table>
<thead>
<tr>
<th>Nasal Breathers</th>
<th>T.min</th>
<th>T.sec</th>
<th>VO₂max</th>
<th>ENDO</th>
<th>MESO</th>
<th>ECTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athlete 1 midfielder</td>
<td>10.2</td>
<td>612</td>
<td>47.06</td>
<td>1.67</td>
<td>4.57</td>
<td>3.01</td>
</tr>
<tr>
<td>Athlete 2 midfielder</td>
<td>10.35</td>
<td>621</td>
<td>46.38</td>
<td>1.81</td>
<td>3.49</td>
<td>3.2</td>
</tr>
<tr>
<td>Athlete 3 midfielder</td>
<td>10.43</td>
<td>625.8</td>
<td>46.03</td>
<td>1.75</td>
<td>3.77</td>
<td>3.22</td>
</tr>
<tr>
<td>Athlete 4 forward</td>
<td>10.45</td>
<td>627</td>
<td>45.94</td>
<td>1.9</td>
<td>2.48</td>
<td>4.14</td>
</tr>
<tr>
<td>Athlete 5 midfielder</td>
<td>11.47</td>
<td>688.2</td>
<td>41.85</td>
<td>2.44</td>
<td>5</td>
<td>2.47</td>
</tr>
<tr>
<td>Athlete 6 full back</td>
<td>11.48</td>
<td>688.8</td>
<td>41.82</td>
<td>1.9</td>
<td>4.21</td>
<td>3.98</td>
</tr>
<tr>
<td>Athlete 7 forward</td>
<td>11.52</td>
<td>691.2</td>
<td>41.67</td>
<td>1.61</td>
<td>2.88</td>
<td>4.33</td>
</tr>
</tbody>
</table>

The first column describes the position of the athletes in game; the second column describes the time in minutes (T.min); the third column, the time in seconds (T.sec); the fourth column, VO₂max; the fifth column presents Ectomorphia (ECTO) of the group in subject.
Table 3 - Presentation of the means and pattern deviation of the groups of the Buccal and Nasal Breathers

<table>
<thead>
<tr>
<th>DADOS</th>
<th>VO2max RB</th>
<th>VO2max RN</th>
<th>ENDO RB</th>
<th>MESO RB</th>
<th>ECTO RB</th>
<th>ENDO RN</th>
<th>MESO RN</th>
<th>ECTO RN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>42.14</td>
<td>44.39</td>
<td>2.59</td>
<td>3.89</td>
<td>2.80</td>
<td>1.87</td>
<td>3.77</td>
<td>3.48</td>
</tr>
<tr>
<td>Pattern Deviation</td>
<td>1.99</td>
<td>2.47</td>
<td>1.09</td>
<td>0.95</td>
<td>0.79</td>
<td>0.27</td>
<td>0.90</td>
<td>0.68</td>
</tr>
</tbody>
</table>

The first column presents the Average of VO2max of the Buccal Breathers (VO2max BB), the second column shows the mean of VO2max Nasal Breathers (VO2max NB), the third column presents the mean of the component Endomorphic of the Buccal Breathers (ENDO BB), the fourth column presents the component Mesomorphic of the Buccal Breathers (MESO BB), the fifth column presents the mean of the component Ectomorphic of the Buccal Breathers (ECTO BB), the sixth column presents the mean of the component Endomorphic of the Nasal Breathers (ENDO NB), the seventh column presents the component Mesomorphic of the Nasal Breathers (MESO NB) and the eighth column shows the mean of the component Ectomorphic of the Nasal Breathers (ECTO NB).

and accomplished the descriptive statistics with emphasis in the mean and pattern deviation of Maximum VO2.

The Table 1 presents the position of the athletes in game, the time in minutes, the time in seconds, esteemed Maximum VO2 in the test of 2400 meters and the athletes’ Buccal Breathers Somatotype. The athletes were put in the order of the best to the worst result in the test, and VO2 also accompanies that order. We can observe that the athletes 1, 2 and 3, that presented a somatotype with Mesomorphy and Endomorphy predominance lowers, they obtained a good result in the test. It can also be observed that they are athletes of game positions with more aerobic demands. Already the athletes 4, 5 and 7, that play in less aerobic game positions, they didn’t obtain good results in the test, and that also those athletes’ Somatotype didn’t present a great predominance of Mesomorphy, presenting a larger Endomorphy. The athlete 6, even being of a game position of larger aerobic demand, was not well in the test, presents a Somatotype with the high component Mesomorphic, however Endomorphy in high values. The Ectomorphic component presented very balanced values among the athletes, except for the athletes 2 and 6, which presented low values compared to the other sample athletes. Those results agree with the affirmatives above related to Somatotype and the relationship of the game position with the aerobic performance.

The Table 2 presents the position of the athletes’ game, the time in minutes, the time in seconds, esteemed Maximum VO2 in the test of 2400 meters and the athletes’ Nasal Breathers Somatotype. The athletes were put in the order of the best for the worst result in the test, and VO2 also accompanies that order. Before of those data it can be observed that the athletes 1, 2 and 3, that play in positions of aerobic demand presented a good result in the test, and they also presented predominance in the Mesomorphic development and a Low Endomorphy.

The athletes 4 and 7, which play in less aerobic positions, didn’t present good results in the tests, also tends a low development of Mesomorphy and Low Endomorphy values. The athlete 5 is shown as an exception, because he plays in a position of larger aerobic demand and demonstrated a relatively good Mesomorphic development and a low Endomorphy, however he was not well in the test. The athlete 6 demonstrated predominance in Mesomorphy and a Low Value of Endomorphy, however he plays in a position of game of less aerobic demand, doesn’t tend a good result in the test. The Ectomorphic component was shown very balanced in all of the athletes. It can be observed that the athletes’ results in the test, except for exceptions, presented a larger Mesomorphic development. According to Kawashima (2005 apud CHAMORRO 2003), the increase of the acting increases with Mesomorphy. Another report is of Chamorro (2005), detaching that high Mesomorphy is a positive factor for the high acting, and a high Endomorphy is considered a negative factor for the acting. However it is necessary to stand out, in agreement with Rocha (2002), that Somatotype is not the only decisive factor for the high performance. An example of that is told by Rodrigues (2002), which says that two individuals with Somatotypical characteristics, muscular mass and similar levers can present difference in the contraction strength, what is explained by the fact of the nervous incentives among them to be different. And how told previously by Milk et al (2004), the muscular strength can improve the capacity of athletes’ resistance.

Another factor that can be observed in the research is the relationship of the position of the athletes’ game with the results in the tests. The athletes of positions with more aerobic character, except for exceptions, presented better acting in the test of 2400 meters, agreeing with Balikean et al (2005), that verified in his study that the side backs and midfielders present larger aerobic capacity than the forwards, fullbacks and goalkeepers. That leads us to analyze each athlete, their characteristics and his acting in the test. Only two exceptions can be seen in the results: the athlete 6, of the Buccal Breathers, and the athlete 5, of the Nasal Breathers, that have positions of larger aerobic demand, however they didn’t obtain a good placement in the test of 2400 meters.

The Table 3 presents the mean and pattern deviation of the values of esteemed maximum VO2 and of the Somatotypical components of the two groups. We can observe and compare that the mean and the pattern deviation of esteemed maximum VO2 of the groups presented difference, tends the Nasal Breathers a larger mean than the Buccal Breathers, however that difference was small, having a statistical value of 0.08, considered no significant in the Student t test with significance of p < 0.05, however, that difference should be taken into account when it is spoken in performance. Somatotype of the two groups demonstrated a well homogeneity among the groups with predominance in the Mesomorphic component, with mean and pattern deviation values of 3.89 ± 0.95, Endomorphy with values of 2.59 ± 1.96 and Ectomorphic, 2.80 ± 0.79 in the Buccal Breathers. The Nasal Breathers demonstrated Mesomorphy values a little smaller than the Buccal Breathers, with mean and pattern deviation of 3.77 ± 0.90, however an Endomorphy a little larger, with values of 1.87 ± 0.27 and Ectomorphic with 3.48 ± 0.68.

The Table 4 demonstrates values of the mean and percentage of the Somatotype components of the two groups where the Buccal
breathers present an Endomorphia 2.59 relative for 28%, Mesomorphia presents values of 3.89 that are equal to 42% and Ectomorphia 2.80 that are equal to 30% of the total. Already the Nasal breathers show 1.87 relative to 20% for Endomorphia, 3.77 relative to 42% of Mesomorphia and 3.48 equivalent to 38% of Ectomorphia.

Following those results it is reached the conclusion that Somatotypia was shown very homogeneous if compared the two groups; Mesomorphia presented very close values; and Endomorphia, is a little more distant for the Buccal Breathers, tends a little larger mean, however not very distant, and Ectomorphia also presents close values, but it could not be considered a significant differentiation. However in the Illustration 2 it can be made a more detailed analysis of each athlete’s Somatotype and of his game position and the relationship of those varied with the results.

The Illustration 1 presents several statistical data, however the one of larger importance for the research is the mean and the pattern deviation of esteemed maximum VO₂, that for the Buccal Breathers presented values of 42.14 ± 1.99 ml (kg.min)⁻¹ and for the Nasal Breathers a mean and pattern deviation of 44.39 ± 2.47 ml (kg.min)⁻¹, those values were analyzed by the Student t test, with significance p < 0.05, and they obtained a value of 0.08, not being considered significant, and are not agreeing with results of studies, as the one of Sequeira (2005), where he tells that the Buccal Breathers can have a 21% smaller performance than the Nasal Breathers. Another study, of Barbierini (2000 apud OLIVEIRA 2005) affirms that it is necessary a planned diagnosis, accomplished by a multidisciplinary team with orthodontist, fonoaudiologist, otorhinolaringologist, physiotherapist and even psychologist for the treatment of those dysfunctions, trying like this to reduce their negative effects on the physical acting. Those statements show the need of more professionals involved in the diagnosis of those dysfunctions, could classify like this the individual in a more necessary way in Buccal or Nasal Breather. For instance, the Nasal Obstruction was not evaluated, that it should be done by an otorhinolaringologist, being that a factor of limitation of the research.

Another limitation factor of the research is its analyzes of the muscular fiber type because, according to Portal et al (2004), the skeletal muscle can be divided in classes with base in histochemistry and biochemistry characteristics of the individual fibers. Powers and Howley (2000) affirms that several studies proved that the type of muscular fiber is essential for the athlete’s good acting. However it is obvious that the number of fibers type varies a lot of according to the person.

Also in agreement with Powers and Howley (2000 apud PORTAL et al 2004), the fibers can be divided basically in slow and fast fibers, and the amount of slow and fast fibers can be influenced by the genetics, for the hormonal levels in the blood and for the training. According to Weineck (2000), the fibers of fast contraction can be more easily transformed in fibers of slow contraction, that the one of slow contraction in fibers of fast contraction, through the training. As the research didn’t control that variable, it cannot evaluate its influence in the test. Still in agreement with that theory, Jesus and Santos (2003) tell that, through the training, several biochemical adaptations can be outstanding for the largest myoglobin concentration, improving the oxygen supply for the mitochondrias. Wilmore and Costill, (2001 apud JESUS and SANTOS 2003), indicate that the endurance training revealed to increase the muscular content of myoglobin in 75% to 80%. A more efficient oxidation of glycogen, due to an increase in the
size of the mitochondrias. That can also be taken into account in relation to the position type in that the athlete acts and the one which physiologic characteristics it prioritizes.

Another no controlled factor was the biological maturation of the athletes’ groups, which, according to Duarte, Albergaria and Filho (2003), has great relationship with the performance. Another important data told by Macêdo and Fernandes Filho (2003) is the relationship of the sexual maturation with Somatotype in children from 9 to 14 years old, because in their studies those authors verified that Mesomorphy and Endomorphy decrease with the increase of the sexual maturation levels, while Ectomorphy increases, due to the decrease of the body fat. Macedo and Fernandes Filho (2003) also tell, in that same study, that Maximum VO$_2$ and the strength of inferior members increase together with the sexual maturation levels and with the age, so much in the masculine as in the feminine sex. Fortes and Castro (2002) corroborate the relationship between Maximum VO$_2$ and the age, affirming in their studies that swimmers with age from 7 to 17 that the maximum consumption of oxygen increases in agreement with the age increase.

Also in reports of Weinbeck (2000) he says that in the second pubertal phase, in other words, the adolescence, that begins about the 14 to 15 years and finishes about the 17 to 18 years in the boys, height increases and the weight decreases and there is an increase of the growth in width, happening the harmonization of the measures proportions. There are also hormonal alterations, causing an increase of 41% on mean in the muscular mass, what causes an impact in the sporting capacities, confirming the biological maturation as soon as is of vital importance for the performance, that can have great influence in the research.

The affirmative agrees with reports of Leite et al (2004) on several studies that demonstrate that the strength training doesn’t harm the resistance acting and that in some cases it can increase, therefore this training type, in spite of generating little or any increase in the maximum oxygen consumption, increases the anaerobic potency, it improves the movement economy and it also increases the time until the exhaustion of race exercises, ski and cyclism, in other words, the muscular strength can influence in the aerobic capacity.

Still as non controlled variable have the subjectivity of the test that, according to Rocha (2002), a test of indirect aerobic capacity is considered, in that the maximum oxygen consumption is calculated in function of the heart frequency, traveled distance and of the ergometer resistance, and other through regression monograms formulas, developed through direct measure. However Lima, Silva and Souza (2005) found in their studies, that the indirect measurement forms of Maximum VO$_2$ obtained good correlation with the direct forms, didn’t presenting significant differences.

**Illustration 4** - Presentation of the results of the ATM evaluation of the Buccal breathers athletes: the Temporomandibular Dysfunction (TMD) was shown in 43% of the athletes of the respective group and 53% didn’t demonstrate signs or symptoms of the Temporomandibular Dysfunction (NO TMD).

The Illustration 4 display another data presented by the statistics: the prevalence of TMD in the Buccal Breathers - 43% of the Buccal Breathers athletes presented TMD symptoms and the Nasal Breathers didn’t present the symptoms, being considered TMD a very related factor with the Buccal Breathing, agreeing with reports of Carvalho (2005), that confirms that the Buccal Breathing can cause a lack of stability of TMJ. Another report about relationship of TMJ with the Buccal Breathing is made by Maciel et al (2003), that points to that dysfunction called of Temporomandibular Dysfunction (TMD) that can take the individual to becoming a Buccal Breathers or vice-versa. Therefore, the study and understanding of that structure is of great importance for our research, however the only factor could not be considered for evaluation of the Buccal Breathing.

With base in the obtained results can be concluded that there was a decrease in the esteemed Maximum VO$_2$ of soccer athletes in the age group from 14 to 15 Buccal Breathers, when compared with the Nasal Breathers. However, those values were not considered statistically significant, with a level 0.08 of significance considered low by the Student t test that has significance value of $p < 0.05$. However, in relation to the performance, those values should be taken into account for comparison with new researches. Somatotypia of Healt and Carter was shown very homogeneous, with predominance in the two groups of Mesomorphic, however the athletes that demonstrated larger Mesomorphic development and smaller values of Endomorphic obtained better results. There was also great relationship with the game position, because the athletes of positions of larger aerobic demand were more efficient in the test. Already the prevalence of TMD was of 43% in the Buccal Breathers and of 0% in the Nasal Breathers, what shows that this dysfunction to articulate has a good relationship with the Buccal Breathing, however it cannot be the only decisive factor for diagnosis.

In agreement with the found results and the research limitations, it is recommended that new studies are accomplished following the following considerations: larger control of the variables, as, for instance, to accomplish the breathing evaluation with a multidisciplinary team, to accomplish more invasive tests, like Ergoespirometry, with maximum tests through which can evaluate...
the athletes’ in a direct way Maximum VO$_2$ for the gases analysis, and to include in the analysis athletes of other age groups, mainly in lower ages, with less developed maturational levels.

REFERENCES


