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Correlations between tongue position and postural control

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INTRODUCTION: The discovery of five different kinds of esteroceptors in the point in which the nasopalatine nerve appears on palate [1] addressed different researches to the study of tongue posture and movement. In fact this anatomical point, known as "palatine spot", is the place in which tongue tip lays during rest and from which starts during swallowing. Moreover Martin et al [2] documented a higher activation of cerebral cortex during tongue elevation than during swallowing, with a significantly higher activity in cingulate gyrus, supplementary motor area, precentral and postcentral gyrus, premotor cortex, putamen and thalamus. On these bases different authors underlined a relation between tongue dysfunctions and postural unbalance, but with no experimental verification. The aim of this study is to evaluate the influence of tongue position on body posture and balance control using stabilometric and baropodometric tests.

METHODS: A total of 180 subjects with disfunctional swallowing (mean age 18.15 years, SD 3.32 years) were divided in a control group (160 subjects) with normal frenulum and in a short frenulum group (20 subjects). All subjects underwent stabilometric and baropodometric tests under two conditions: with tongue in normal position and with tongue tip on palatine spot. All trials were conducted with eyes closed. Confidence Ellipse Area (CEA) and Sway Path Length (SPL) stabilometric parameters, and

Heel Load (HL) and Feet Load Difference (FLD) baropodometric, parameters were analyzed through repeated measures ANOVA and Tukey-Kramer multiple-comparison test.

RESULTS: CEA showed significant differences between groups ($p=0.010$) and within condition ($p<0.001$); with significant increase for both groups in palatine spot condition and with higher values in control group. SPL showed significant differences between groups ($p=0.020$) and within conditions ($p<0.001$) and a significant interaction of group and condition factors ($p=0.001$); with significant differences between group only in normal condition and significant increase within conditions only in control group. In palatine spot condition, HL showed significant increase for both feet ($p<0.001$) and FLD a significant decrease ($p=0.001$) no significant differences between groups or interaction of group and condition were detected in baropodometric parameters (Fig.1).

CONCLUSIONS: The results suggest a correlation between tongue position and posture. The worsening of stabilometric outcomes could be interpreted as the effort in dysfunctional subject to reach palatine receptors; this effort is particularly evident in subjects with anatomical impediment such as short frenulum. Moreover, the improvement in subjects' posture, recorded by baropodometry, could be the signal of neuro-muscular effect of palatine receptors on posture.

REFERENCES

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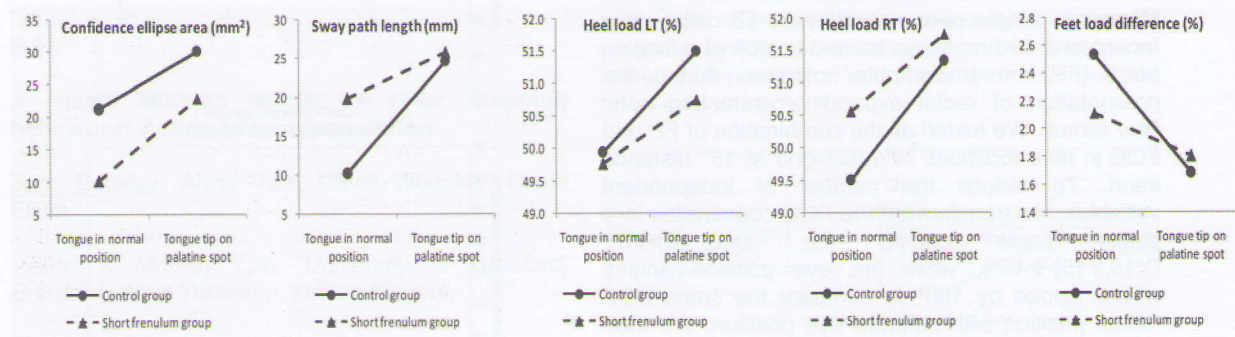


Fig.1 Mean results for stabilometric and baropodometric parameters