

# Relationship between mandibular position and support planting in 7-year-old children: pilot study

Karina Correia Bonalumi Bittar<sup>1</sup>, Camile Ludovico Zamboti<sup>2</sup>,  
Christiane de Souza Guerino Macedo<sup>3</sup>

<sup>1,2</sup>Physiotherapy Department, State University of Londrina, Londrina, Brasil

<sup>3</sup>Rehabilitation Science Department, State University of Londrina, Londrina, Brasil

<sup>2</sup>Corresponding author

**E-mail:** <sup>1</sup>[karinabbittar@gmail.com](mailto:karinabbittar@gmail.com), <sup>2</sup>[camileludovico@hotmail.com](mailto:camileludovico@hotmail.com), <sup>3</sup>[chmacedouel@yahoo.com.br](mailto:chmacedouel@yahoo.com.br)

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Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Abstract.** Introduction: Postural stability can be maintained in balance by muscle tone [1]. Change in the mandibular position or posture, may have influence in the postural reflex, defined as an involuntary defense movement [2] to correct deviations and keep the body in balance. If the postural change is constant, the muscles will move the mandible to a more comfortable position, with consequent postural change<sup>2</sup> and plantar support. The aim of the study was to compare the plantar support in centralized and in lateralization mandibular position in seven years' children. Main text: This study was approved by research ethics committee (No. 4.346.542). A pilot study was carried out with seven-year-old children of both sexes. Photogrammetry was performed with spherical markers in the region of the right tragus and chin symphysis (Fig. 1) concomitantly with baropodometry following (Fig. 2, 3) the protocol established by Bittar et al. [4]. Analysis of mandibular displacement and plantar support were performed with centralized mandibular position (maximum intercuspation) and with lateral displacement to the right and left. Statistical analysis compared the differences in mandibular displacement to the right and left sides using Student's *t* test. Differences in plantar support variables with centralized mandibular position and in right and left lateralization position were established by the Anova one way test and the Bonferroni pos test. Significant statistical difference was reached by 5 %. Results: Twelve seven-year-old children were included, 20.8 (3.25) Kg and 1.18 (0.06) meters. The sample present greater lateral displacement of the mandible to the lefts compared to right side. Mandibular lateralization was confirmed with statistical difference compared to mandibular position centralized. No difference in all plantar support variables was observed between the three positions: centralized and left and right lateralization. Conclusions: No differences were observed for plantar support compared position in mandibular lateralization and centralized position. Mandibular lateralization displacements did not change plantar support.

**Keywords:** baropodometry, plantar pressure, child, mandibular position, photogrammetry.

## 1. Introduction

Postural stability can be maintained in balance by muscle tone [5]. If there is a change in the mandibular position or posture, these can trigger the postural reflex, which is an involuntary defense movement [6] to correct deviations and keep the body in balance. The more balanced the afferents from the visual, vestibular and somatosensory systems, the more difficult it is to observe changes in the stomatognathic system with plantar support [2]. The aim of the present study was to determine whether different mandibular positions alter plantar support in seven-year-old children. The impact and differences of mandibular position with plantar support are inconclusive. Researches present inadequate methodologies with methodological bias and small samples. In this way, studies with a larger sample size may contribute to establish the influence of mandibular positioning on plantar support and guide clinical assessment and rehabilitation strategies in children.

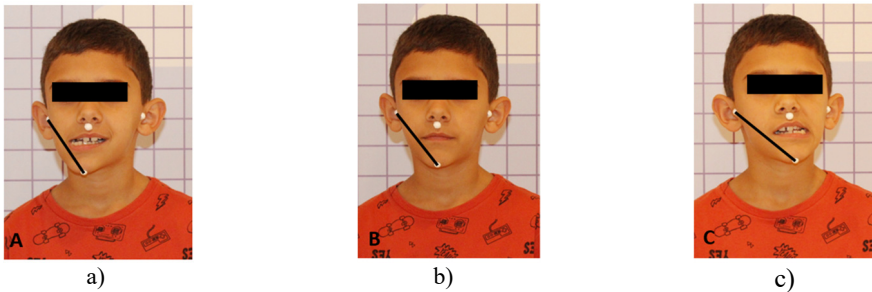
## 2. Study

Pilot study with a sample of 12 children, both sexes, 7 years old, weighing 20.8 (3.25) and height 1.18 (0.06 s). Project approved by the Research Ethics Committee of the University State of Londrina, with opinion No. 4,346,542.

Markers were placed at the points: right tragus, chin and left tragus regions (Fig. 1) for photogrammetry. To confirm the lateral displacement of the mandible, the mento-tragus distances to the right (A), PIM (B) and left (C) were considered, with analysis of the displacement in mm using the IMAGEJ program.

Baropodometer for plantar support following protocol [4] (Fig. 2). Plantar support variables: Mean pressure, maximum pressure and surface area in the right and left foot (Fig. 3), analyzed by BaroScan.

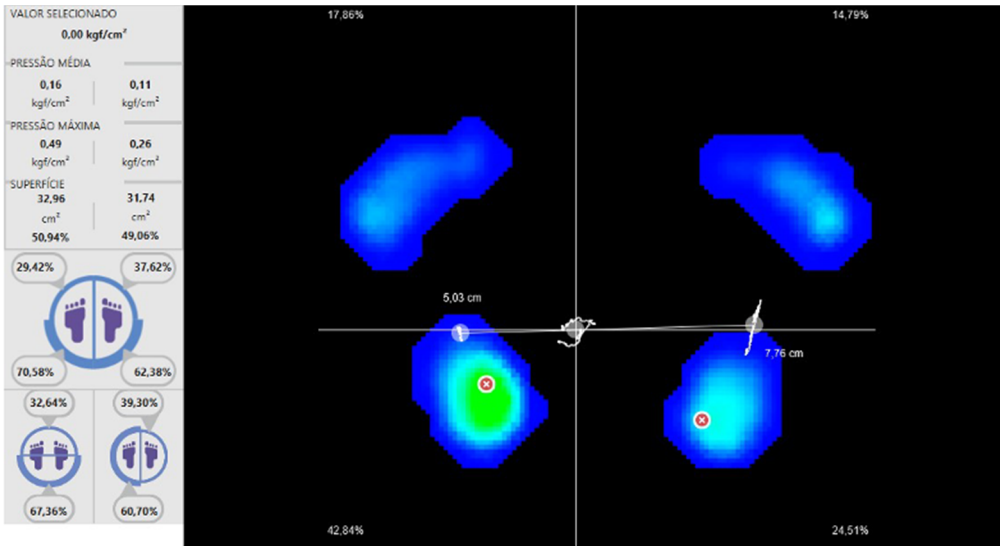
Statistical analysis compared differences in mandibular displacement to the right and left by Student's *t* test. Differences in plantar support variables with the mandible in the central position, displaced to the right and to the left were established by the Anova one way test and the Bonferroni post test. The significant difference was set at 5 %.



**Fig. 1.** Assessment of mandibular displacement amplitude in centralized posture and in right and left lateralization: a) mandible lateralized to the right, b) centered jaw, c) mandible lateralized to the left



**Fig. 2.** Assessment position of plantar support in the baropodometer



**Fig. 3.** Plantar support image in the baropodometer analysis, average pressure, maximum pressure and surface area

### 3. Results

The displacement distance of the mandible to the right was 5.33 mm and to the left was 9.96 mm, with a significant difference ( $p < 0.01$ ).

**Table 1.** Results

		Jaw in central position	Displacement 5,33 mm Right jaw	Displacement 9,96 mm left jaw	<i>P</i>
Right foot	Average pressure	0,13	0,13	0,12	$p = 0,97$
	Maximum pressure	0,40	0,41	0,39	$p = 0,98$
	Surface area	34,64	34,93	35,15	$p = 0,97$
Left foot	Average pressure	0,15	0,16	0,15	$p = 0,98$
	Maximum pressure	0,58	0,59	0,59	$p = 0,99$
	Surface area	40,12	40,40	40,54	$p = 0,98$

### 4. Conclusions

Children in this study have greater left-sided jaw movement. Mandibular movements did not change plantar support. Research with a larger *N* must be performed to actually prove or disprove these results.

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### Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Conflict of interest

The authors declare that they have no conflict of interest.

## Ethics statement

The research met all applicable standards for the ethics of experimentation. Permission to carry out biomedical research was granted by CAAE of Universidade Estadual de Londrina, No. 37725020.8.0000.5231 permission number 4,346,542, issue date October 19, 2020. Participants provided written informed consent prior to the study.

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**Karina Correia Bonalumi Bittar** graduated from the Northern University of Paraná. Postgraduate degree in functional jaw orthopedics by the Paulista Association of Dental Surgeons APCD, Campinas-SP; Postgraduate in Pediatric Dentistry by the North Paraná Association AONP, Londrina-Pr. Master's student in Rehabilitation Sciences at the State University of Londrina UEL, Londrina-PR.



**Camile Ludovico Zamboti**, PT Ph.D, Department of Physiotherapy, Laboratory of research in respiratory physiotherapy (LFIP), Londrina State University, Londrina, Brazil.



**Christiane de Souza Guerino Macedo**, PT Ph.D, Doctor Teacher in Department of Physiotherapy, Laboratory of research in respiratory physiotherapy (LFIP), Londrina State University, Londrina, Brazil.