



The prevalence and distribution of hypodontia in orthodontic patients in Bosnia and Herzegovina

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ABSTRACT

Introduction: The need for this study on the prevalence of hypodontia in a sample of orthodontic patients from Bosnia and Herzegovina arises from the fact that in the state of Bosnia and Herzegovina, there is a lack of data on the prevalence and distribution of hypodontia as a previously defined, growing global problem and that it could emphasize the importance of its early diagnosis, as this is still the best standard for preventing the occurrence of complications due to a lack of teeth. The aim of this retrospective study was to determine the prevalence and distribution of hypodontia in orthodontic patients in Bosnia and Herzegovina.

Methods: The study was conducted in the Orthodontic Department of the University of Sarajevo, Faculty of Dentistry, with the Center for Clinical Dentistry. The study included all patients who presented to the Orthodontic Department in the period from January 2020 to March 2023 and whose diagnostic protocol included panoramic radiographs, which were analyzed for the purposes of this study. The sample consisted of the orthopantomography radiographs of 5084 patients (2031 males and 3053 females).

Results: Hypodontia was found in 6.77% of orthodontic patients, of which 38.4% were male patients and 61.6% were female. The teeth most frequently affected by hypodontia were the second premolars (68.15%). After stratifying the sample by jaw, the most common hypodontic tooth was the second premolar in the mandible and the lateral incisor in the maxilla.

Conclusion: We can conclude that the prevalence of hypodontia in orthodontic patients in Bosnia and Herzegovina and its distribution are very similar to the general population. The results of this study may help to improve the early diagnosis of hypodontia as a growing problem, which may reduce the complications that may arise from missing a tooth.

Keywords: Hypodontia; orthodontics; prevalence; Bosnia and Herzegovina

INTRODUCTION

Hypodontia is generally defined as the developmental failure of one or more teeth, with the exception of the third molar, in both the primary and permanent dentition. Hypodontia mainly refers to a condition in which fewer than six teeth are missing. Researchers have used a wide range of terms to define this condition: Reduced number of teeth, dental aplasia, congenital lack of teeth, absence of teeth, dental agenesis, lack of teeth, etc. (1).

Agenesis is a term that refers to the absence of a tooth germ or the inability of a tooth germ to develop physiologically. The

term “isolated hypodontia” refers to the congenital absence of a tooth or a small number of teeth. Forms of incomplete dentition that are not classified as hypodontia include missing teeth due to delayed eruption, extraction due to caries or orthodontic treatment, trauma, or any other reason (2).

Previous research has shown that many different factors can be implicated in the etiologic agenesis of teeth (3).

A series of sequential, genetically controlled, molecular interactions are involved in the process of tooth development. Many factors, transforming growth factor β , bone morphogenetic proteins, fibroblast growth factors, and epidermal growth factors, play a role in signaling the epithelial-mesenchymal interaction in tooth development. An alteration in one or more signaling pathways may impair tooth development and play an important role in the occurrence of the condition known as hypodontia (4).

Previous studies have shown that the prevalence of hypodontia has increased significantly in the twentieth century (5).

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The reasons for the increased prevalence of hypodontia may be evolutionary changes or simply an increase in hypodontia diagnoses and not necessarily evolution alone. Some authors claim that evolutionary changes occur for reasons of adaptation in the form of a gradual reduction in the size of the jaw (6).

According to a study conducted in 2021, the prevalence of hypodontia worldwide was highest in Africa (13.4%), followed by Europe (7%) and Asia (6.3%) (7).

In areas of this region, such as the Republic of Croatia, the prevalence of hypodontia is one of the highest in Europe according to the data (8).

The increase in the prevalence of hypodontia was also demonstrated in studies from 2020 on orthodontic patients in Serbia (9) and Slovenia based on results from 2013 (10).

More recently, data on the prevalence of hypodontia from 2020 were also collected in Bosnia and Herzegovina, where hypodontia was found to be more common than hyperdontia (11).

The need for this study on the prevalence of hypodontia in a sample of orthodontic patients from Bosnia and Herzegovina arises from the fact that the state of Bosnia and Herzegovina lacks data on the prevalence and distribution of hypodontia (11,12) as previously defined growing global problem (1) and that it could emphasize the importance of its early diagnosis as still the best standard for preventing the occurrence of complications caused by a lack of teeth.

The aim of this study was to determine the prevalence and distribution of hypodontia in orthodontic patients attending the Department of Orthodontics at the Faculty of Dentistry, University of Sarajevo.

METHODS

The study was conducted at the Department of Orthodontics, Faculty of Dentistry, University of Sarajevo with the Center for Clinical Dentistry. This retrospective cross-sectional study included all patients who presented to the Department of Orthodontics in the period from January 2020 to March 2023 and whose diagnostic protocol included panoramic radiographs, which were analyzed for the purposes of this study.

The sample consisted of the orthopantomography radiographs of 5084 patients (2031 males and 3053 females) aged 8-18 years. Hypodontia was recorded if a tooth or tooth germ was missing on the panoramic radiograph, with losses due to trauma, caries, periodontopathy, or orthodontic extraction. In addition to the overall prevalence of hypodontia, its distribution was also determined in relation to the sex of the subjects (patients), the type of missing tooth in relation to its position in the dental arches – the side (left/right), the jaw (mandible, maxilla or both) and the frequency of hypodontic teeth.

Inclusion criteria were children and adolescents of white ethnicity from Bosnia and Herzegovina who visited the Department and Clinic of Orthodontics in the period between January 2020 and March 2023, patients who were not undergoing orthodontic treatment and who had good quality and technically correct orthopantomography radiographs.

Exclusion criteria were patients with cleft lip and palate, patients who were undergoing orthodontic treatment or who had previously undergone and completed orthodontic treatment, poor quality, technically incorrect radiographs, previous loss of a tooth due to caries, trauma, periodontal disease or as part of orthodontic treatment. The study was approved by the Ethics Committee of the University of Sarajevo - Faculty of Dentistry (Decision No.: 02-3-4-19-1-2/2023).

The statistical analysis was performed using IBM Statistical Package for the Social Sciences Statistics, version 21.0. Data are presented as absolute values (n) and percentages (%). The χ^2 test was used to analyze the dependence between the categories of the variables. $p < 0.05$ was considered a statistically significant difference.

RESULTS

Of the total of 5084 patients, 344 (6.77%) were found to have hypodontia, while the remaining 4740 (92.23%) had no hypodontia (Graph 1).

Of the 4740 patients without hypodontia, 1899 (40.1%) were male, while the remaining 2841 (59.9%) were female. Of the 344 patients with hypodontia, 132 (38.4%) were male, while the remaining 212 (61.6%) were female (Graph 2).

Of the total 90 patients with hypodontia on the left side, 33 (36.7%) were male, while the remaining 57 (63.3%) were female. Of the total 88 patients with hypodontia on the right side, 30 (34.1%) were male, while the remaining 58 (65.9%) were female. Of the total 166 patients with bilateral hypodontia, 69 (41.6%) were male, while the remaining 97 (58.4%) were female. No significant difference was found in the prevalence of hypodontia related to the mandibular side in relation to gender ($p = 0.470$) (Graph 3).

Of the total 134 patients with maxillary hypodontia, 53 (39.5%) were male, while the remaining 81 (60.4%) were female. Of the total 150 patients with hypodontia in the mandible, 53 (35.3%) were male, while the remaining 97 (64.7%) were female. Of the total 60 patients with hypodontia in both jaws, 26 (43.3%) were male, while the remaining 34 (56.7%) were female. No significant difference was found in the prevalence of hypodontia in the affected jaw in relation to gender ($p = 0.525$) (Graph 4).

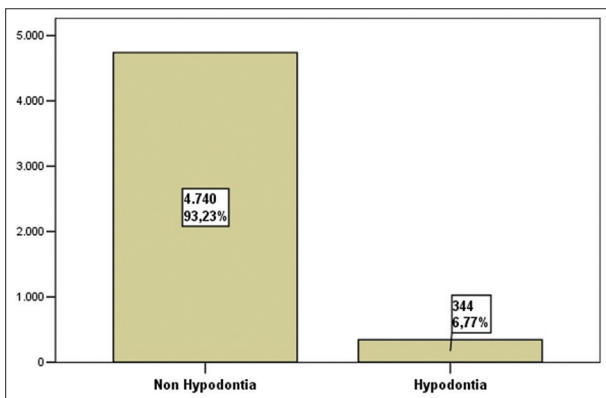
Of the total 653 teeth affected by hypodontia, hypodontia affected a central incisor in two (0.31%), a lateral incisor in 145 (22.21%), eye teeth in 18 (2.76%), first premolars in 38 (5.82%), second premolars in 445 (68.15%), while other molars were affected in the remaining 5 (0.77%) (Graph 5).

After stratifying the sample by jaw, the most common hypodontic tooth was the second premolar in the mandible and the lateral incisor in the maxilla.

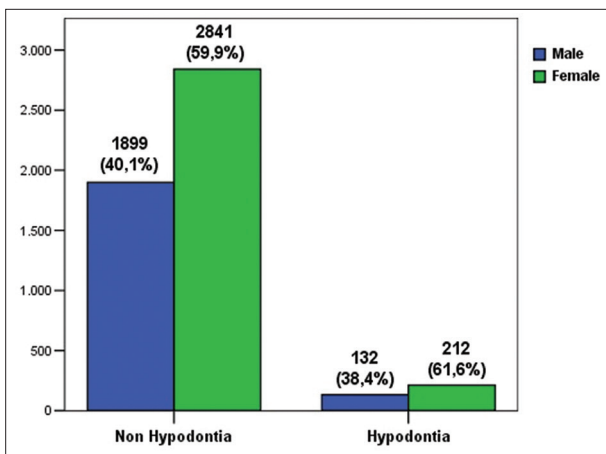
DISCUSSION

The prevalence of hypodontia varies considerably in many studies in different ethnic groups and geographical areas, ranging from 2.2% to 10.1% (13).

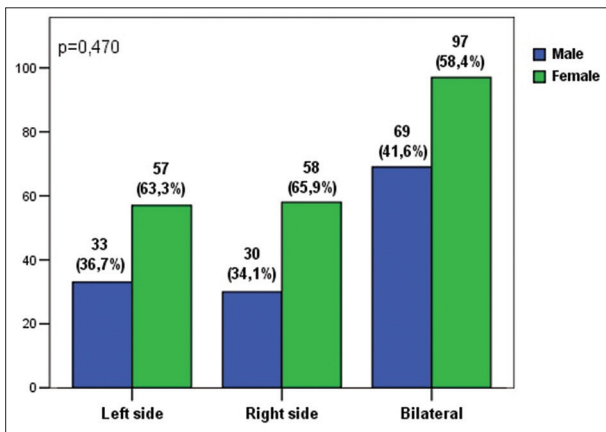
The wide range of hypodontia may be attributed to differences in sampling methods, sample size, and ethnic and racial differences (11).



GRAPH 1. The prevalence of hypodontia in the total sample.



GRAPH 2. The distribution of gender in relation to patients with and without hypodontia.

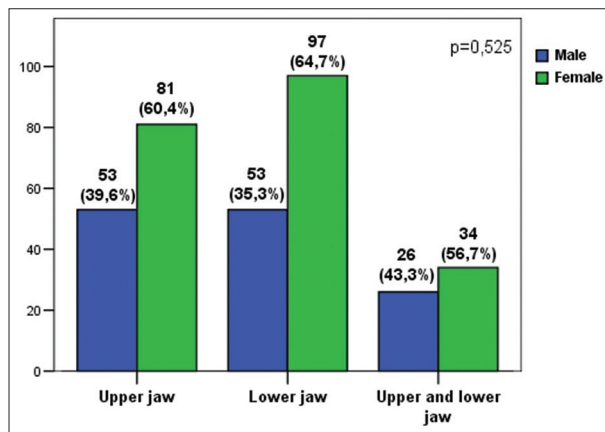


GRAPH 3. The prevalence of hypodontia in relation to the side of the mouth and gender.

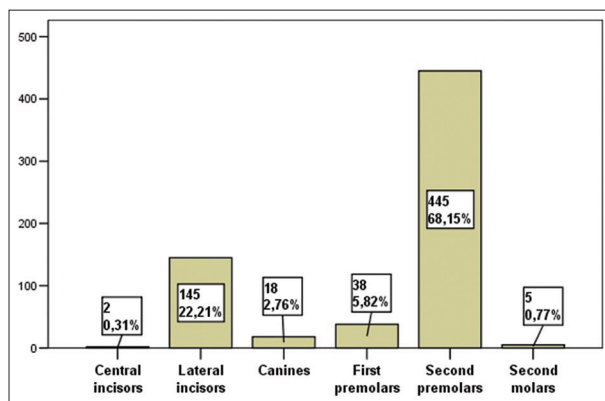
In this study, the presence of hypodontia was found in 6.77% of subjects who were orthodontic patients, which is approximately the same percentage of hypodontia in the general population. These approximate results have also been confirmed by similar studies (14,15).

In addition, regional studies from the Republic of Croatia show a prevalence of hypodontia of 7.5% and 7.8% (8,16), which are similar to our results.

The significantly higher prevalence of hypodontia in females (61.6%) compared to males (38.4%) in our results is similar to the studies by Hashim and Al-Said from Qatar (15),



GRAPH 4. The prevalence of hypodontia in relation to the affected jaw and gender.



GRAPH 5. Frequency of hypodontia according to the type of tooth agenesis.

Fekonja from Slovenia (10) and Nikolov and Badrov from Croatia (8,13), in contrast to other studies (13,17) where the difference between genders was not large or significant.

Regarding the distribution of hypodontia in relation to the affected side of the jaw, both sides were most frequently affected (in 166 patients), while the left and right sides were affected almost equally (90 left, 88 right). With regard to gender, no significant difference in the prevalence of hypodontia was found in relation to the mandibular side ($p = 0.470$). Several other studies came to similar conclusions (18-20).

However, the results of several studies showed that unilateral occurrence of dental agenesis was more common than bilateral (8,21,22), but these differences were small and not statistically significant.

Regarding the prevalence of hypodontia in relation to the affected jaw, most patients had hypodontia in the mandible (150), slightly less in the maxilla (134), while the smallest number (60) had hypodontia in both jaws. Similar results were published by Gökkaya et al. (23), and the fact that there was no statistically significant difference in the prevalence of hypodontia between the maxilla and mandible was also confirmed by Nikolov et al. (24). In a study comparing the prevalence of hypodontia in the maxilla and mandible, hypodontia was found to be more common in the mandible (25).

The results of some studies have confirmed the higher prevalence of hypodontia in the maxilla (26,27).

No significant difference was found in the prevalence of hypodontia in relation to the affected jaw in relation to gender ($p = 0.525$).

In terms of the distribution of individual teeth affected by hypodontia, the second premolar is the most frequently represented with a percentage of 68.15%, i.e. in 445 subjects, which was also confirmed by the cross-sectional study by Elsherif et al. (28). This is followed by the lateral incisors (22.21%). A Polish study from 2019 also confirmed a similar distribution of hypodontic teeth (29), as did studies conducted on Italian orthodontic patients (13).

Slightly different results were published in Iranian, Brazilian, and American studies, in which the upper lateral incisors were the teeth most frequently affected by hypodontia (30-32).

CONCLUSION

It was found that hypodontia was present in 6.77% of orthodontic patients from Bosnia and Herzegovina. A significantly higher prevalence of hypodontia was found in female subjects compared to males. Hypodontia was slightly more common in the mandible than in the maxilla and least common in both jaws. The localization of hypodontia in relation to the left or right side showed no significant differences. The second premolar was the tooth most frequently affected by hypodontia.

We can state that the prevalence of hypodontia in orthodontic patients in Bosnia and Herzegovina and its distribution are very similar to the general population. The results of this study may help to improve the early diagnosis of hypodontia as a growing problem, which may reduce the complications that may arise from missing a tooth.

DECLARATION OF INTEREST

Authors declare no conflict of interest.

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