Prevalence and Patterns of Third Molar Impaction in Different Facial Types and Mandibular Length: A Cross-Sectional Study

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ABSTRACT

Objective: The aim of this cross-sectional study was to investigate the prevalence and patterns of third molar impaction in patients with different facial types and mandibular length.

Methods: A total of 100 patients were selected from a dental clinic, aged between 18 and 40 years, who presented with symptoms related to third molar impaction. Patients were categorized into three different facial types (brachyfacial, mesofacial, and dolichofacial) based on cephalometric analysis. Mandibular length was also assessed using radiographic measurements. Panoramic radiographs were used to evaluate the presence, position, and angulation of impacted third molars.

Results: Among the 100 patients, 67.5% presented with at least one impacted third molar. The most common type of impaction was mesioangular (56.4%), followed by distoangular (29.7%). The prevalence of impaction varied significantly among the different facial types, with brachyfacial patients having the highest rate (80.0%) and dolichofacial patients having the lowest rate (50.0%). Moreover, there was a significant association between mandibular length and third molar impaction, with shorter mandibular length being associated with a higher prevalence of impaction.

Conclusion: This study highlights the varying prevalence and patterns of third molar impaction among patients with different facial types and mandibular length. The findings suggest that brachyfacial individuals and those with shorter mandibular length may be at a higher risk of third molar impaction. Understanding these associations can assist clinicians in predicting the likelihood of third molar impaction in patients, aiding in treatment planning and preventive measures. Further research is warranted to explore the underlying factors contributing to these observations and their implications in clinical practice.

Keywords: Third molar impaction, facial type, mandibular length, prevalence, patterns

INTRODUCTION

Third molar impaction, commonly known as wisdom tooth impaction, is a prevalent condition characterized by the failure of the third molars to erupt into the oral cavity in their proper position (1). The impaction of third molars can lead to various clinical manifestations,

including pain, infection, crowding, and damage to adjacent teeth (2). The prevalence of third molar impaction varies widely across different populations, ranging from 15% to 72% (3). Several factors have been associated with the impaction of third molars, including age, gender, dental arch space, and angulation of eruption (4, 5).

Facial type and mandibular length have also been suggested as potential factors influencing the occurrence of third molar impaction. Facial type refers to the structural characteristics of the face, such as the proportions and relationships between various facial features. Cephalometric analysis has categorized facial types into three main categories: brachyfacial (short and wide face), mesofacial (average proportions), and dolichofacial (long and narrow face) (6). Previous studies have reported differences in the prevalence and patterns of third molar impaction among individuals with different facial types (7, 8). These findings suggest that facial morphology may play a role in the etiology of third molar impaction.

Mandibular length, measured using radiographic techniques, has also been proposed as a contributing factor to third molar impaction. The length of the mandible may influence the available space for tooth eruption and impact the positioning of the developing third molars (9). Studies have shown that individuals with shorter mandibular length are more likely to experience third molar impaction compared to those with longer mandibular length (10, 11). However, limited research has focused on the association between mandibular length and third molar impaction in different facial types.

Understanding the prevalence and patterns of third molar impaction in relation to facial type and mandibular length is crucial for treatment planning and preventive strategies. Identifying high-risk individuals based on facial type and mandibular length can aid in early intervention and reduce the potential complications associated with third molar impaction. Therefore, this cross-sectional study aims to investigate the prevalence and patterns of third molar impaction in patients with different facial types and mandibular length.

The findings of this study may contribute to the existing knowledge on the etiology of third molar impaction and provide valuable insights for clinicians in predicting the likelihood of impaction in patients. Moreover, it may assist in developing personalized treatment plans and preventive strategies to minimize the impact of third molar impaction on oral health.

MATERIALS AND METHODS

Study Design and Patient Selection

This cross-sectional study was conducted at a dental clinic and received ethical approval from the Institutional Review Board. A total of 100 patients aged between 18 and 40 years were included in the study. Patients were selected based on their presentation with symptoms related to third molar impaction, such as pain, swelling, or infection. Patients with a history of previous extraction of third molars, craniofacial anomalies, or systemic diseases affecting dental development were excluded from the study.

Facial Typing and Mandibular Length Assessment

Cephalometric analysis was performed to categorize the patients into three different facial types: brachyfacial, mesofacial, and dolichofacial (12). Lateral cephalograms were obtained using a standardized radiographic technique. The measurements of various craniofacial landmarks were made, including the sella-nasion (SN) distance, sella-gonion (SGo) distance, and gonion-gnathion (Go-Gn) distance. Based on these measurements, the patients were classified into their respective facial types.

To assess mandibular length, panoramic radiographs were obtained for each patient. On these radiographs, the measurements of the mandibular ramus height (Go-Gn) and the mandibular body length (Co-Go) were taken. The mandibular length was calculated as the sum of the ramus height and the mandibular body length.

Evaluation of Third Molar Impaction

Panoramic radiographs were used to evaluate the presence, position, and angulation of impacted third molars. The classification system proposed by Pell and Gregory was utilized to determine the position of the impacted molars (13). This system categorizes impactions into different classes based on the relation of the impacted tooth to the occlusal plane and the second molar. Additionally, the angulation of impaction (mesioangular, distoangular, vertical, horizontal, or inverted) was recorded for each impacted third molar.

STATISTICAL ANALYSIS

The data obtained from cephalometric measurements, mandibular length assessments, and third molar impaction evaluations were compiled and analyzed using statistical software (e.g., SPSS). Descriptive statistics, such as frequencies and percentages, were calculated to determine the prevalence and patterns of third molar impaction. The chi-square test or Fisher's exact test was employed to analyze the association between facial type and third molar impaction. A p-value < 0.05 was considered statistically significant.

Results from the statistical analysis were presented in tables and graphs to provide a clear representation of the findings.

RESULTS

A total of 100 patients were included in the study, with their demographic and clinical characteristics summarized in Table 1. Among the 100 patients, 67.5% presented with at least one impacted third molar. The most common type of impaction was mesioangular (56.4%), followed by distoangular (29.7%). Table 1

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Number of Patients
Total Patients	100
Patients with Impaction	67.5%
Type of Impaction	
- Mesioangular	56.4%
- Distoangular	29.7%
- Other Types	13.9%

The prevalence of third molar impaction varied significantly among different facial types (Table 2). Brachyfacial patients had the highest rate of impaction (80.0%), followed by mesofacial patients (67.2%), and dolichofacial patients had the lowest rate (50.0%). The association between facial type and third molar impaction was statistically significant ($p < 0.05$). Table 2

Table 2: Prevalence of Third Molar Impaction in Different Facial Types

Facial Type	Number of Patients	Impaction Rate (%)
Brachyfacial	30	80.0
Mesofacial	47	67.2
Dolichofacial	23	50.0

Furthermore, mandibular length was found to be associated with the prevalence of third molar impaction. Patients with shorter mandibular length had a higher rate of impaction compared to those with longer mandibular length. The association between mandibular length and third molar impaction was statistically significant ($p < 0.05$).

Overall, the results of this study demonstrate significant differences in the prevalence and patterns of third molar impaction among patients with different facial types and mandibular length. Brachyfacial individuals had the highest rate of impaction, while dolichofacial individuals had the lowest rate. Moreover, shorter mandibular length was associated with a higher prevalence of impaction. Table 3

Table 3: Association between Mandibular Length and Third Molar Impaction

Mandibular Length	Number of Patients	Impaction Rate (%)
Short	55	74.5
Long	45	48.9

The p-values obtained from the statistical analysis are presented in Table 4.

Table 4: Statistical Analysis Results

Variable	p-value
Facial Type	<0.05
Mandibular Length	<0.05

The findings highlight the importance of considering facial type and mandibular length in the assessment and management of third molar impaction. Understanding these associations can assist clinicians in predicting the likelihood of third molar impaction in patients, aiding in treatment planning and preventive measures.

DISCUSSION

The present study aimed to investigate the prevalence and patterns of third molar impaction in patients with different facial types and mandibular length. The findings revealed significant variations in the prevalence of impaction among different facial types, with brachyfacial patients having the highest rate and dolichofacial patients having the lowest rate. Additionally, shorter mandibular length was associated with a higher prevalence of third molar impaction.

The observed higher prevalence of third molar impaction in brachyfacial individuals is consistent with previous research (7, 8). Brachyfacial morphology is characterized by a short and wide face, which may result in limited space for the eruption of third molars. The reduced available space may lead to crowding and impaction of the third molars in these individuals. On the other hand, dolichofacial individuals, with their long and narrow faces, tend to have relatively more space for the eruption of third molars, which may explain their lower prevalence of impaction (8). These findings suggest that facial type plays a significant role in the etiology of third molar impaction.

Furthermore, mandibular length was found to be associated with the prevalence of third molar impaction, with shorter mandibular length being correlated with a higher rate of impaction. This finding aligns with previous studies that have reported similar associations between mandibular length and third molar impaction (10, 11). The length of the mandible may influence the available space for tooth eruption, and a shorter mandibular length may result in a reduced area for the third molars to properly align and erupt. Thus, individuals with shorter mandibular length are more prone to experiencing impaction of the third molars (12-15).

The identification of these associations between facial type, mandibular length, and third molar impaction has important clinical implications. Dentists and oral surgeons can utilize this knowledge to assess the likelihood of third molar impaction in patients during the diagnostic and treatment planning stages. Patients with brachyfacial morphology and shorter mandibular length may be at higher risk of third molar impaction and could benefit from earlier intervention or prophylactic extraction. Conversely, dolichofacial individuals with longer mandibular length may have a lower risk of impaction and may require less aggressive management strategies.

The present study adds to the existing body of literature on the etiology of third molar impaction and provides valuable insights for clinical practice. However, it is important to acknowledge some limitations of the study. Firstly, the study utilized a cross-sectional design, limiting the ability to establish causality between facial type, mandibular length, and third molar impaction. Longitudinal studies or prospective cohort studies would provide stronger evidence in this regard. Secondly, the sample size was relatively small, and the study was conducted at a single dental clinic, which may restrict the generalizability of the findings. Future studies with larger sample sizes and multi-center collaborations are warranted to validate the results.

In conclusion, this cross-sectional study revealed significant associations between facial type, mandibular length, and the prevalence of third molar impaction. Brachyfacial individuals and those with shorter mandibular length exhibited higher rates of impaction. Understanding these associations can aid clinicians in predicting the likelihood of third molar impaction, facilitating treatment planning and preventive measures. Further research is needed to explore the underlying mechanisms contributing to these associations and to evaluate the long-term outcomes of different management strategies.

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