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# Tomographic Study of the Internal Anatomy of Mandibular Third Molars Based on Vertucci's Classification

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**Abstract**

**Introduction:** Knowledge of the internal anatomy of mandibular third molars is essential for successful endodontic treatment, yet their complex morphology often complicates management. This study evaluated the root canal morphology of mandibular third molars using cone-beam computed tomography (CBCT) according to Vertucci's classification. **Materials and Methods**: A total of 653 CBCT scans were screened, and 274 mandibular third molars meeting the inclusion criteria were analyzed. Root canal configurations were classified according to Vertucci, with atypical cases recorded as "type 0" for statistical purposes. Data were analyzed with Fisher's exact test ($\alpha$=0.05). **Results**: Vertucci type I was the most prevalent configuration (62.8%), followed by type V (17.4%). Sex and dental arch side significantly influenced the distribution of configurations (*P*=0.044 and *P*=0.013, respectively), while age did not (*P*=0.569). Distal and distolingual roots were predominantly type I, whereas mesial roots showed greater variability, particularly between sexes. **Conclusion**: Mandibular third molars exhibit considerable anatomical variation, with types I and V being most frequent. Patient sex and arch side significantly affect root canal morphology, underscoring the importance of detailed preoperative assessment with CBCT for accurate endodontic planning.

**Keywords:** Cone-beam Computed Tomography; Endodontics; Mandibular Third Molar; Root Canal Morphology; Vertucci Classification

## Introduction

The main goal of endodontic treatment is the prevention or treatment of infections. The persistence of lesions after treatment indicates failure, which is often linked to therapeutic difficulties [1]. Although treatment is largely predictable, with success rates ranging from 86% to 98% [2], the morphological complexity of root canals represents a significant challenge, as limited knowledge of their internal anatomy can compromise adequate cleaning and disinfection [3].

Radiography is generally used for the assessment of root morphology; however, two-dimensional images limit the analysis of three-dimensional anatomy, leading to superimpositions and possible diagnostic errors [4]. Cone-beam computed tomography (CBCT) can overcome these limitations by providing an accurate three-dimensional view, which is particularly useful for the analysis of mandibular third molars, facilitating endodontic planning [5, 6].

Extraction of the mandibular third molar is often preferred because of complications, as these teeth are more susceptible to cavities due to their location, anatomy, and eruption pattern [7]. However, endodontic treatment may be indicated to preserve function in restorative, prosthetic, and orthodontic situations and in the case of patients with decompensated systemic conditions or those using bisphosphonates. In the latter, surgery must be avoided to prevent osteonecrosis of the jaws [8]. Thus, limited knowledge of morphological variations in the mandibular third molar poses a significant challenge to successful treatment. The dentist must have a good understanding of this complex anatomy to plan and perform the treatment safely [9].

Therefore, the aim of the present study was to evaluate the internal morphology of mandibular third molars by CBCT according to the classification of Vertucci (1984), correlating the findings with sex (female or male), age group (underage: <17; adult (19-59) and elderly (>60) and the side of the dental arch (right or left).

## Materials and Methods

### *Ethical aspects*

This study was approved by the Research Ethics Committee of Centro Universitário FIS (UNIFIS) (Opinion number 6.810.950) and was conducted in accordance with the ethical guidelines of Resolution 510/16 of the National Health Council, as well as the ethical principles of the Declaration of Helsinki for research involving humans. As this was a retrospective study with previously acquired computed tomography scans, informed consent was waived, in accordance with CNS Resolution No. 510/16.

### *Population and sample*

This descriptive, observational, database study was conducted in Serra Talhada, Pernambuco, Brazil. After approval by the Research Ethics Committee of UNIFIS, mandibular tomographic scans of patients seen for maxillary or mandibular examinations between July 2024 and March 2025 were selected from the database of a private dental radiology service in Serra Talhada, Pernambuco, Brazil (FACES Radiologia Odontológica). Only scans that met the established inclusion and exclusion criteria were selected to compose the sample of the present study.

### *Cone-beam computed tomography*

The private dental radiology service uses the Carestream 8100® 3D cone-beam computed tomography scanner (CarestreamHealth, Rochester, NY, USA) for the acquisition of tomographic scans. This device provides volumetric data in just a few seconds.

For the acquisition of CBCT images, the patient was placed in the device in such a way that the occlusal plane remained parallel to the ground, following the image acquisition protocol recommended by the manufacturer of the device. Volumetric images were acquired with an isotropic voxel of approximately 75 µm, which provides high resolution for the evaluation of fine anatomical details. After initial acquisition, the images appear on the computer screen within a few sec and are stored in ".xstd format" (xoran extension) for subsequent evaluation.

### *Inclusion and exclusion criteria*

#### Inclusion criteria

Scans of patients who exhibited unilateral or bilateral mandibular third molars in the examinations performed for mandibular evaluation were included.

#### Exclusion criteria

Endodontically treated teeth, teeth with extensive caries, incomplete root formation, implants, root remnants and fused roots, and impacted teeth were excluded from the examinations performed for mandibular evaluation. It should be noted that impacted third molars were excluded since they are not indicated for endodontic treatment. Scans without diagnostic quality, maxillary scans, mandibular scans in which the mandibular third molars were missing, and mandibular scans in which all mandibular third molars were compromised by any of the criteria cited above were excluded.

Additionally, scans with imaging artifacts in the region of the mandibular third molars were also excluded. An imaging artifact is defined as an imaging finding visualized on a tomographic scan that is not part of the object investigated, i.e., it corresponds to a distortion or error in the reconstructed data. Artifacts can be the result of patient movement during the examination, and particularly of the presence of high-density objects (usually metal objects) associated with factors related to the device.

### *Calibration*

The tomographic images were evaluated by an examiner previously trained and calibrated in performing the proposed assessment using CBCT. Calibration consisted of evaluating the tomographic images of 20 mandibular first molars, selected according to the pre-established inclusion and exclusion criteria, under the same conditions of visualization. Mandibular first molars were chosen to avoid reducing the number of teeth eligible for morphological analysis since the tomographic scans used in this step are not part of the final sample of the present study.

In this step, the teeth were evaluated and re-evaluated after one week to determine the intraexaminer agreement in the assignment of morphological types to the root canals according to Vertucci's classification. The data obtained were tabulated in an Excel spreadsheet (Microsoft, Redmond, Washington, USA) and then transferred to SPSS (Statistical Package for Social Sciences, Version 20; IBM, Armonk,NY, USA) to assess intraexaminer reliability using Cohen's kappa test. The kappa coefficient was 0.937, classified as "almost perfect" agreement.

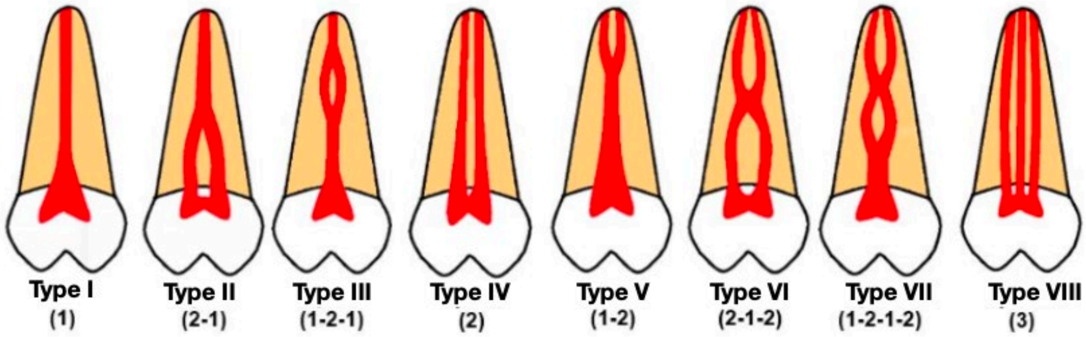


***Figure 1.*** Schematic diagram of Vertucci Classification [10]

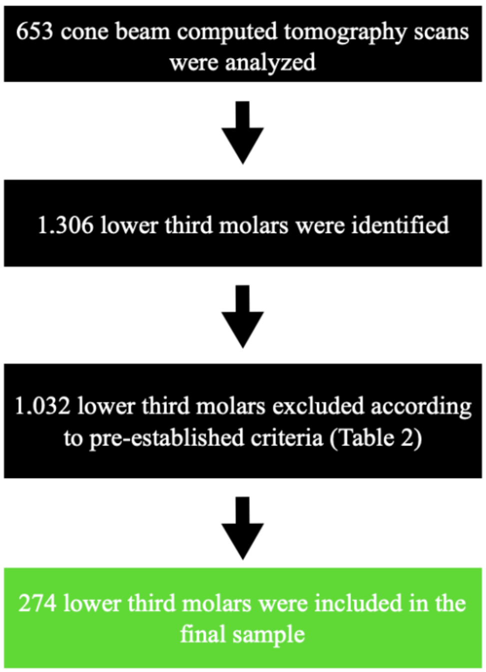


***Figure 2.*** Sample selection flowchart

***Sample selection***

Tomographic scans from the database performed for different reasons were analyzed. Scans with *1*) insufficient FOV, *2*) scans exhibiting at least one of the exclusion criteria attributed to mandibular third molars, or *3*) scans with poor diagnostic image quality were not considered for evaluation.

***Evaluation of tomographic images***

The root canal morphology of the mandibular third molars was evaluated in a dark and silent environment with the CS 3D Imaging program using a notebook with a 15.6" screen. At the interface of the program used, the root canals were examined using coronal, axial, and sagittal sections.

Prior to evaluation, the images were processed using the same filter (sharpness, brightness, and contrast) to allow better visualization and standardization of the reconstructions. In the window of the axial sections, the examiner determined the section where the long axis of the mandibular third molar had the largest diameter, which was visualized along its long axis (corte localizador). The 3D reconstruction was performed using CS 3D Imaging software (Carestream Dental, São José dos Campos, SP, Brazil). Based on the corte localizador, the examiner determined the central sagittal section. Using this window of sections, the volume was rotated to align the long axis of the tooth with the vertical plane. The examiner then assessed the morphology of the mandibular canals on sagittal, coronal, and axial sections and classified them based on Vertucci's classification [10], which is the most commonly used system. This classification is illustrated in Fig. 1 and described in Table 1 [11].

During image analysis, cases that did not fit any of the types of the original Vertucci classification such as C-shaped canals, anastomoses, or prominent accessory canals were coded as type 0. It should be noted that this morphology does not constitute a formal classification, nor a new morphological classification, and was used solely as a statistical resource for descriptive and comparative purposes.

***Data analysis***

A database was created in a Microsoft Excel spreadsheet, which was exported to SPSS 20 (Statistical Package for Social Sciences, Version 20; IBM, Armonk, NY, USA) for analysis of the data. Percentage frequencies were calculated and frequency distributions were constructed to assess the distribution of patient profiles. To compare the distribution of Vertucci configurations among patient profiles, a contingency table was constructed and Fisher's exact test was applied. All conclusions were drawn considering a level of significance of 5%.

## Results

A total of 653 tomographic scans performed for different reasons in a population from the Sertão region of Pernambuco were evaluated, totaling 1,306 mandibular third molars. Of these, 1,032 scans were excluded (Table 2). Thus, 274 teeth composed the sample of the present study, the selection flow is summarized in Fig. 2.

The distribution of Vertucci configurations for all roots of the mandibular third molars according to sex, age group, and dental arch is presented in Table 3 and Figs. 3, 4 & 5. There was a higher prevalence of type I in males and females (56.6% and 67.4%, respectively), followed by type V (20.4% and 15.2%, respectively). Despite some similarities in the distribution of Vertucci types between male and female patients, the homogeneity test was significant (*P*=0.044), indicating that the patient's sex significantly alters the distribution of Vertucci configurations.

Regarding age group, there was a higher prevalence of type I in minors, adults and older adults (50.0%, 58.7% and 71.5%, respectively), followed by type V (50.0%, 18.6% and 14.3%, respectively). The homogeneity test was not significant (*P*=0.569), indicating that age does not significantly alter the Vertucci classification of patients (Table 3). Vertucci type I was the most prevalent configuration in the left and right arches (64.0% and 61.9%, respectively), followed by type V (12.0% and 21.6%, respectively). The homogeneity test was significant (*P*=0.013) (Table 3).

Analysis of the distribution of Vertucci configurations in mesial roots showed a higher prevalence of type V in males (41.2%), while types I and V were more prevalent in females (31.3% for both). The homogeneity test was significant (*P*=0.022), indicating that the patient's sex significantly alters the distribution of Vertucci configurations. Regarding age group, younger patients had a higher prevalence of type V (100.0%). In the adult group, there was a higher prevalence of type V (37.8%), while types I and V were more prevalent in the group of elderly patients (33.3% for both). Despite point differences in the distribution of Vertucci configurations between the age groups evaluated, the test was not significant (*P*=0.476), indicating that age does not significantly alter the Vertucci classification of patients. Regarding the side of the dental arch, the left side exhibited a higher prevalence of type I (26.7%), while the right side showed a higher prevalence of type V (44.1%). The homogeneity test was significant (*P*=0.016), indicating a statistically significant difference in the distribution of Vertucci configurations between teeth of the two arches.

Regarding the distribution of Vertucci configurations in distal roots according to sex, age group, and dental arch, there was a higher prevalence of type I in both males and females (94.5% and 99.3% respectively), followed by type V (0.9% and 0.7%, respectively).

Despite some similarities in the distribution of Vertucci types between male and female patients, the homogeneity test was significant (*P*=0.031), indicating that the patient's sex significantly alters the distribution of Vertucci configurations. Regarding age group, there was a higher prevalence of type I in minors, adults, and older adults (100.0%, 95.4% and 100.0%, respectively), followed by type V (1.5% in adults). The homogeneity test was not significant (*P*=1,000), indicating that age group does not significantly alter the Vertucci classification of patients. In relation to the side of the dental arch, Vertucci type I was the most prevalent configuration in the left and right arches (98.2% and 96.5%, respectively), followed by type III on the left side (1.8%) and type V on the right side (1.4%). The homogeneity test was not significant (*P*=0.419), indicating a statistically similar distribution of Vertucci configurations between teeth of the two arches.

Analysis of the distribution of Vertucci configurations in distolingual roots according to sex, age group, and dental arch showed a higher prevalence of type I in both males and females (100.0% for both groups). Regarding age group, there was a higher prevalence of type I in adults and older adults (100.0% for

***Table 1.*** Morphological classification of root canals according to Vertucci (1984)

| | |
|---|---|
| **Type I** | A single canal extending from the pulp chamber to the apex. |
| **Type II** | Two separate canals leave the pulp chamber but merge short of the apex to form a single canal. |
| **Type III** | A single pulp chamber canal that divides into two and then merges back into one. |
| **Type IV** | Two distinct canals extend from the pulp chamber to the apex. |
| **Type V** | A single canal leave the chamber and divide into two separate canals at the apex. |
| **Type VI** | Two separate canals leave the pulp chamber, merge in the body of the root, and again divide into two distinct canals short of the apex. |
| **Type VII** | A single canal that divides, merges, and exits into two distinct canals short of the apex. |
| **Type VIII** | Three distinct canals extend from the pulp chamber to the apex of the root. |

***Table 2.*** Teeth excluded according to the established criteria

| Exclusion criteria | *n* |
|---|---|
| **Insufficient FOV** | 254 |
| **Missing mandibular third molars** | 534 |
| **Impacted mandibular third molars** | 150 |
| **Incomplete root formation** | 11 |
| **Fused roots** | 32 |
| **Extensive caries** | 9 |
| **Scan without diagnostic quality** | 26 |
| **Endodontic treatment** | 13 |
| **Root remnant** | 3 |
| **Imaging artifact** | 0 |
| **Implant** | 0 |
| **All mandibular third molars compromised according to any of the exclusion criteria** | 0 |
| **Total** | 1.032 |

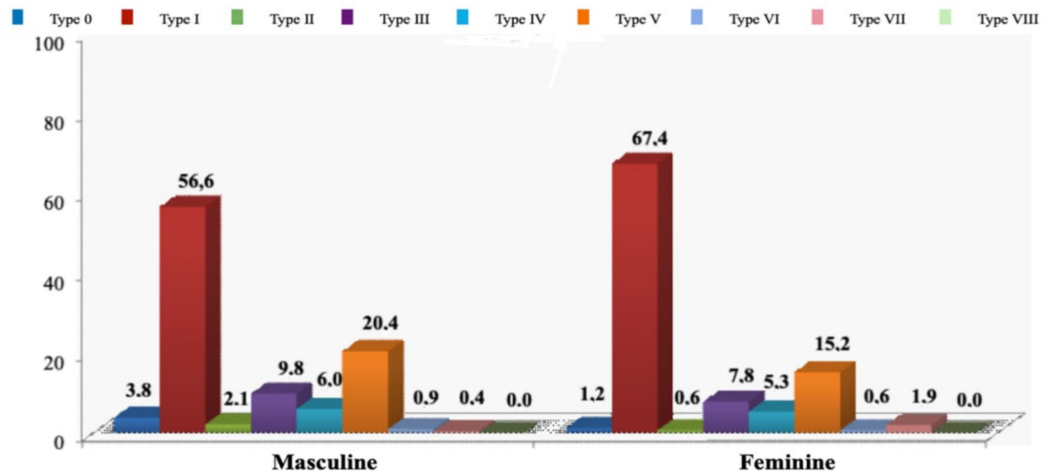


***Figure 3.*** Distribution of the Vertucci classification, for all roots of the lower third molars, according to the patient's sex

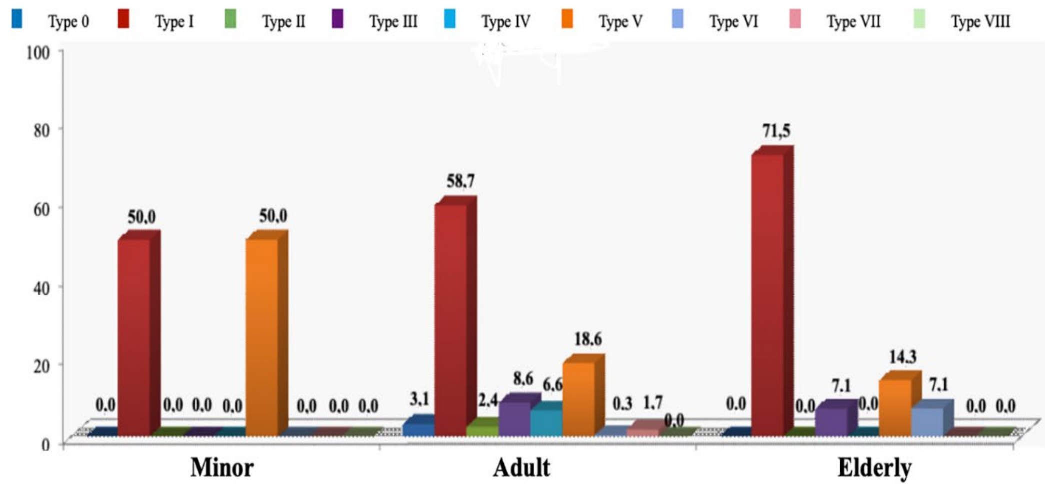


***Figure 4.*** Distribution of the Vertucci classification, for all roots of the lower third molars, according to the patient's age group

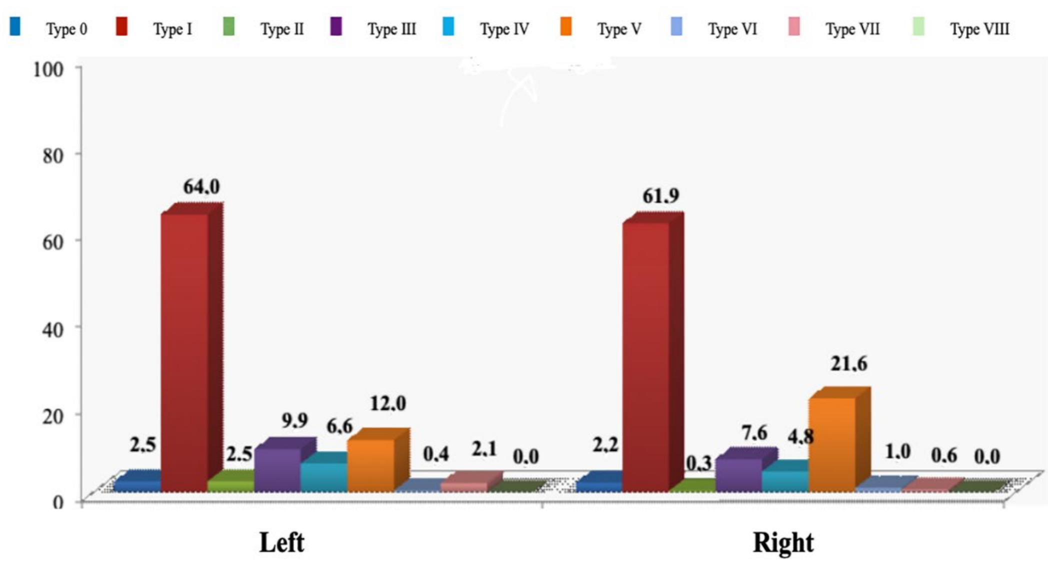


***Figure 5.*** Distribution of the Vertucci classification, for all roots of the lower third molars, according to the side of the patient's arch

both groups), with no cases among minors. In relation to the side of the dental arch, Vertucci type I was the most prevalent configuration in the left and right arches (100.0% for both groups). The comparison test was not applied because there was no variation in the distribution of Vertucci configurations among the categories evaluated.

For distobuccal roots, analysis of the distribution of Vertucci configurations according to sex, age group, and dental arch demonstrated a higher prevalence of type I in both males and females (100.0% for both groups). Regarding age group, there was a higher prevalence of type I in adults and older adults (100.0% for both groups), with no cases among minors. Regarding the side of the dental arch, Vertucci type I was the most prevalent configuration in the left and right arches (100.0% for both groups). The comparison test was not applied because there was no variation in the distribution of Vertucci configurations among the categories evaluated.

For mesiolingual roots, analysis of the distribution of Vertucci configurations according to sex, age group, and dental arch showed a higher prevalence of type I in females (100.0%). There were no cases among males. Regarding age group, there was a higher prevalence of type I in adult patients (100.0%), with no cases among minors and older adults. To the side of the dental arch, Vertucci type I was the most prevalent configuration in the left and right arches (100.0% for both groups). The comparison test was not applied because there was no variation in the distribution of Vertucci configurations among the categories evaluated.

With respect to the distribution of Vertucci configurations in mesiobuccal roots according to sex, age group, and dental arch, a higher prevalence of type I was observed in females (66.6%), followed by types 0 and V (16.7% for both). There were no cases in the group of males. Regarding age group, there was a higher prevalence of type I in adults (66.7%), followed by type 0 (33.3%). There were no cases among minors or older adults. In relation to the side of the dental arch, Vertucci type I was the most prevalent configuration in the left and right arches (100.0% on the left side and 50.0% on the right side). The homogeneity test was not significant ($P$=1.00), indicating a statistically similar distribution of Vertucci configurations between teeth of the two arches.

Analysis of the distribution of Vertucci configurations in mandibular third molars with single roots according to sex, age group, and dental arch showed that type I was more prevalent in both males (100%) and females (66.7%), followed by type V in females (33.3%). The homogeneity test ($P$=1.00) indicated that sex does not significantly influence the distribution of configurations. Regarding age group, types I and V were equally prevalent in minors and adults (50% each). In the group of older adults, there was a higher prevalence of type I (100.0%). There were no cases among minors. The homogeneity test was not

**Table 3.** Distribution of Vertucci's configurations for all roots of mandibular third molars according to sex, age group, and dental arch

| Vertucci's classification | Total | | Sex | | Age group (years) | | | Side of dental arch | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Male | Female | Minor (≤17) | Adult (18-59) | Older adult (60+) | Left (D38) | Right (D48) |
| | N | % | (*n*=235, 42.2%) | (*n*=322, 57.8%) | (*n*=2, 0.6%) | (*n*=290, 94.8%) | (*n*=14, 4.6%) | (*n*=242, 43.4%) | (*n*=315, 56.6%) |
| **Type 0** | 13 | 2,3 | 9 (3.8%) | 4 (1.2%) | 0 (0.0%) | 9 (3.1%) | 0 (0.0%) | 6 (2.5%) | 7 (2.2%) |
| **Type I** | 350 | 62,8 | 133 (56.6%) | 217 (67.4%) | 1 (50.0%) | 170 (58.7%) | 10 (71.5%) | 155 (64.0%) | 195 (61.9%) |
| **Type II** | 7 | 1,3 | 5 (2.1%) | 2 (0.6%) | 0 (0.0%) | 7 (2.4%) | 0 (0.0%) | 6 (2.5%) | 1 (0.3%) |
| **Type III** | 48 | 8,6 | 23 (9.8%) | 25 (7.8%) | 0 (0.0%) | 25 (8.6%) | 1 (7.1%) | 24 (9.9%) | 24 (7.6%) |
| **Type IV** | 31 | 5,6 | 14 (6.0%) | 17 (5.3%) | 0 (0.0%) | 19 (6.6%) | 0 (0.0%) | 16 (6.6%) | 15 (4.8%) |
| **Type V** | 97 | 17,4 | 48 (20.4%) | 49 (15.2%) | 1 (50.0%) | 54 (18.6%) | 2 (14.3%) | 29 (12.0%) | 68 (21.6%) |
| **Type VI** | 4 | 0,7 | 2 (0.9%) | 2 (0.6%) | 0 (0.0%) | 1 (0.3%) | 1 (7.1%) | 1 (0.4%) | 3 (1.0%) |
| **Type VII** | 7 | 1,3 | 1 (0.4%) | 6 (1.9%) | 0 (0.0%) | 51.7%) | 0 (0.0%) | 5 (2.1%) | 2 (0.6%) |
| **Type VIII** | 0 | 0,0 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| ***P*-value[1]** | - | | 0.044[1] | | 0.569[1] | | | 0.013[1] | |

[1]*Fisher's exact test.*

significant ($P$=1.00), indicating that age group does not significantly alter the Vertucci classification of patients. Regarding the side of the dental arch, there was a higher prevalence of type I on the left side (100.0%). Type I and V configurations were more prevalent on the right side (50.0% each). The homogeneity test was not significant ($P$=0.40), indicating a statistically similar distribution of Vertucci configurations between teeth of the two arches.

## Discussion

This study addresses the biological importance of mandibular third molars and the divergent opinions regarding the indications for endodontic treatment of these teeth. Considering the scarcity of information on the root canal morphology of this tooth group in the population from the Sertão region of Pernambuco, this study aimed to fill this gap and thereby contribute to enhancing treatment efficacy and our understanding of the techniques used for the anatomical analysis of these structures.

The retrospective study by Somasundaram *et al.* [12] using 325 CBCT scans obtained from a population in India identified a predominance of Vertucci types I, II, and IV (33.3%) in mandibular third molars with two roots, with a higher prevalence of type II in the mesial root (55.6%) and type I in the distal root (87.5%). In teeth with three roots, types II and IV predominated (50%), while most teeth with a single root exhibited type I. Similar findings were obtained in the present study conducted in the Sertão region of Pernambuco, especially the predominance of type I in distal and single roots, reinforcing the anatomical consistency in these regions. However, a lower prevalence of type II was observed in the mesial roots compared to Somasundaram's study, possibly reflecting regional or ethnogenetic differences, such as the admixture characteristic of the population of Northeastern Brazil, which may influence root morphology. These findings suggest that, although there are consistent anatomical patterns globally, local variations may occur and should be considered in clinical practice.

Despite the similarities with the Indian study, the present study revealed important differences in the mesial root, especially when analyzed according to sex: type V was more prevalent in males (41.2%), while there was an equal proportion of types I and V (31.3%) in females. These findings indicate that sex significantly influences root canal morphology in this Brazilian sample. However, both studies agree on the influence of laterality on root canal configuration, reinforcing the importance of including anatomical and demographic variables in endodontic planning, especially for third molars. However, it should be noted that the higher prevalence of Type V mesial roots in males may be related to biological differences between the sexes, possibly influenced by genetic or hormonal factors, although this hypothesis should be interpreted with caution.

Using CBCT, Hafezi *et al.* [13] identified a high prevalence of Vertucci type I (45.4%) and IV (34.48%) configurations in the mesial root of mandibular third molars and a marked predominance of type I in the distal root (91.95%). These data are consistent with the findings of the present study, in which type I predominated in distal roots, however a higher frequency of types I and V (both 31.3%) was observed in mesial roots of females. However, the present study is particularly interesting because it included additional variables such as sex, age group, and laterality, which permitted a more comprehensive analysis of root morphology in a regional population.

Džanković *et al.* [8] found that mandibular third molars generally had two roots, with a predominance of type I and IV configurations in mesial roots and the presence of a single canal in distal roots. In this study, atypical classifications were found among 1.2% of women and 3.8% of men. Additional configurations were more frequent in teeth with fused roots, in contrast to the present study in which morphological variations were even identified in roots with conventional anatomy. Despite the differences, both studies indicate a predominance of type I in the distal root and greater morphological diversity in the mesial root.

The study by Džanković *et al.* [8] analyzed exclusively impacted or partially impacted third molars using dye and stereomicroscopy for root canal examination. The authors recognized that the specific sample selection may have influenced the results since the effect of impaction on canal morphology is not yet fully understood. Therefore, methodological and sampling differences must be taken into account when comparing these data with other studies.

Different *in vitro* and *in vivo* methods have been used for the study of root canal morphology. Al-Qudah *et al.* [14] found a predominance of Vertucci type I in conical roots (75%) and in distal roots of teeth with two or three roots (89.21% and 88.88%, respectively). In teeth with two roots, the mesial root showed a higher prevalence of type IV (46.08%), followed by type I (27.45%). On the other hand, in teeth with three roots, type I was observed in 100% of distolingual roots and in 72.22% of mesial roots. The latter also exhibited type V (16.66%) and other configurations at equal proportions.

The study by Al-Qudah *et al.* [14] showed a predominance of Vertucci type I in single, distolingual, and distal roots, similar to the findings obtained for a population from the Sertão region of Pernambuco. However, differences were noted in the mesial root, with type V being more common among men (41.2%), while equal proportions of types I and V were observed in women (31.3%). These variations might be related to genetic, environmental, or ethnic factors, a fact that highlights the importance of knowledge about anatomical variations for effective clinical planning.

It is important to recognize that the age distribution of this sample constituted a limitation of this study. The small number of minors and elderly participants may have impacted the statistical power of the analyses involving the age variable, which may explain the lack of significant differences observed. Therefore, the age-related results should be interpreted with caution, and future investigations with larger samples and a more balanced age distribution are recommended to further clarify these findings. Another limitation of this study is the sample obtained from a single private radiology center. This criterion may introduce selection bias, as the patients treated at this type of service may not represent the general population, limiting the generalizability of the findings. Future studies with multicenter samples or samples from different population contexts would be useful to validate and expand upon the results presented.

Root configurations other than Type I, as described in the Vertucci classification, present greater anatomical complexity, characterized by multiple canals, ramifications, accentuated curvatures, and the presence of accessory canals. These variations increase the challenges of endodontic treatment, favoring the occurrence of transports, steps, perforations, or incomplete instrumentation, which compromises disinfection and three-dimensional sealing [6]. In these cases, careful exploration of the cavity is essential, combined with the use of high-resolution images and an expanded field of view with operative microscopy. Prior knowledge of these morphologies will allow adapting the design of the access cavity for better canal localization, selecting more flexible instruments that facilitate the modeling of complex areas, and employing obturation techniques, such as thermoplasticized obturation, which ensure an effective three-dimensional seal, increasing treatment predictability and safety. Similarly, in third molars, this information guides decision-making regarding the viability of conservative treatment or the need for a surgical approach, reducing intraoperative complications and increasing the predictability of results.

Finally, it is worth noting that the unclassifiable anatomies assigned in this study as "Type 0" only for statistical analysis purposes may reflect both limitations of Vertucci's original classification and genuinely atypical anatomical variations of the root canal system. These findings reinforce the importance of detailed diagnostic approaches, such as cone beam computed tomography, for better endodontic planning and anticipating clinical challenges, highlighting that clinical practice must adapt to the observed anatomical variability [6, 15-17].

## Conclusion

Mandibular third molars are characterized by diverse variations in Vertucci configurations (1984), with a predominance of types I and V in a population from the Sertão region of Pernambuco. Patient sex and side of the tooth in the dental arch were found to significantly influence the morphological types found.

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None.

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***Authors' contributions***
Conception and design of study: JMIM. Data acquisition, analysis and interpretation: ASA/JMIM. Manuscript writing: ASA/JMIM/RBT/SRAV/ARSS/MMMX/HAGO. Critical review of manuscript: AFCJ/GPG/JMIM. All authors read and approved the final manuscript.

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