

# Understanding root and canal structures in teenagers: a study on extracted mandibular premolars in Damascus

<b>Submission date</b> 17/03/2025	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 18/03/2025	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 05/05/2026	<b>Condition category</b> Oral Health	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

The structure of dental roots is complex and varied so it's important to understand the pulp anatomy and structure for successful root canal treatment. This study looked at the number, length, and root canal structure of lower premolars taken from teenagers in Damascus.

### Who can participate?

Adolescents aged 12-15 years with at least one intact lower premolar needing orthodontic extraction

### What does the study involve?

The participants' premolars were measured and their root numbers were assessed and x-rayed to assess their morphology.

### What are the possible benefits and risks of participating?

The main benefit is to assess the root canal structure of the Damascus population. No possible risks are proposed as this study is an observational study.

### Where is the study run from?

Damascus University (Syria)

### When is the study starting and how long is it expected to run for?

January 2023 to March 2025

### Who is funding the study?

Damascus University (Syria)

### Who is the main contact?

Dr Yasser Alsayed Tolibah, [yasser94.tolibah@damascusuniversity.edu.sy](mailto:yasser94.tolibah@damascusuniversity.edu.sy) or [Yasseralsayedtolibah@gmail.com](mailto:Yasseralsayedtolibah@gmail.com)

# Contact information

## Type(s)

Public, Scientific, Principal investigator

## Contact name

Dr Yasser Alsayed Tolibah

## Contact details

Almazzeah Street

Damascus

Syria

20872

+963 (0)988812044

yasser94.tolibah@damascusuniversity.edu.sy

# Additional identifiers

## Protocol serial number

UDDS-361-13032023/SRC-2654

# Study information

## Scientific Title

An epidemiological study of root number, length, and canal morphology in extracted mandibular premolars from adolescent patients in Damascus

## Study objectives

The null hypothesis proposes that gender does not influence the number of roots, their length, or the canal morphology of mandibular premolars

## Ethics approval required

Ethics approval required

## Ethics approval(s)

approved 15/03/2023, Damascus University (Almazzeah Street, Damascus, 20872, Syria; +963 (0) 944372202; sgd@damascusuniversity.edu.sy), ref: 361

## Study design

Epidemiological study

## Primary study design

Observational

## Study type(s)

Diagnostic

## Health condition(s) or problem(s) studied

Root number, length, and root canal anatomy of extracted mandibular premolars

## **Interventions**

The sample consisted of 250 recently extracted first and second MPs during orthodontic treatment of adolescents aged 12–15 years from Damascus at the Pediatric Dentistry, Orthodontics, and Oral and Maxillofacial Surgery Departments, Faculty of Dentistry, Damascus University. Premolars that had undergone endodontic treatment, or had internal/external resorption, deformities, open apices, or fractures during extraction were excluded. Each patient signed an informed consent form, stating that the extracted premolar would be used in an epidemiological study. Therefore, 216 first and 132 second MPs met the inclusion criteria, forming a total sample of 232 intact-root MPs. Each extracted premolar was assigned a number, and the patient's gender was recorded to accompany each premolar's data. Soft tissues, bone fragments, and calculus were removed through scaling and polishing. At this stage, the number of roots and the maximum length of premolars were determined in millimeters with a digital caliper (WEN Digital Caliper, Performance Tool - Wilmar LLC, Kent, Washington, USA). Subsequently, two periapical radiographs were taken for each extracted premolar to provide a three-dimensional understanding of its canal morphology: one in the buccolingual direction and one in the mesiodistal direction. This was done using a portable radiographic unit (PRU) (HyperLight, Eighteeth; Changzhou Sifary Medical Technology Co., Ltd., Changzhou City, Jiangsu Province, China) with the following settings: exposure time of 0.08 seconds, 65 kVp, and 2.5 mA. The PRU was positioned perpendicular to the tooth's long axis and the surface of the digital sensor (EzSensor HD; Vatech, Gyeonggi-do, Korea) in both radiographs.

## **Intervention Type**

Other

## **Primary outcome(s)**

1. Premolar root numbers counted immediately after premolar extraction
2. Premolar length measured in mm immediately after premolar extraction
3. Root canal morphology assessed immediately after premolar radiographing. Vertucci's classification was adopted to assess the canal morphology in both radiographs in each premolar:  
Type I (1-1): A single canal from the pulp chamber to the apex.  
Type II (2-1): Two separate canals leave the chamber and merge near the apex to form a single canal.  
Type III (1-2-1): A single canal leaving the pulp chamber, dividing into two, then rejoining to form one canal.  
Type IV (2-2): Two separate canals from the pulp chamber to the apex.  
Type V (1-2): A single canal leaving the chamber and dividing into two separate canals at the apex.  
Type VI (2-1-2): Two separate canals leaving the pulp chamber, merging in the middle of the root, and dividing again into two short, separate canals at the apex.  
Type VII (1-2-1-2): A single canal dividing, merging, and then separating into two short, separate canals at the apex.  
Type VIII (3-3): Three separate canals in one root from the pulp chamber to the apex.

## **Key secondary outcome(s)**

The gender effects on the root number (one, two, three or more roots), their length (in mm), and the canal morphology of mandibular premolars (Vertucci classification), assessed statistically after analyzing the data

## **Completion date**

15/03/2025

# Eligibility

## Key inclusion criteria

1. Adolescents in Damascus
2. Intact mandibular premolars

## Participant type(s)

Healthy volunteer

## Healthy volunteers allowed

No

## Age group

Child

## Lower age limit

12 months

## Upper age limit

15 months

## Sex

All

## Total final enrolment

250

## Key exclusion criteria

1. Syndromes patients
2. Premolars fractured during the extraction process

## Date of first enrolment

30/03/2023

## Date of final enrolment

15/01/2025

# Locations

## Countries of recruitment

Syria

## Study participating centre

**Damascus University, Faculty of Dentistry**

Almazzeah ST, Damascus, Syria

Damascus

Syria

20872

# Sponsor information

## Organisation

Damascus University

## ROR

<https://ror.org/03m098d13>

# Funder(s)

## Funder type

University/education

## Funder Name

Damascus University

## Alternative Name(s)

University of Damascus, , DU

## Funding Body Type

Government organisation

## Funding Body Subtype

Universities (academic only)

## Location

Syria

# Results and Publications

## Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study will be available upon request from Yasser Alsayed Tolibah ([yasseralsayedtolibah@gmail.com](mailto:yasseralsayedtolibah@gmail.com))

The type of data that will be shared: patient age and gender with all data in an Excel file

Dates of availability: by 01/01/2026

Whether consent from participants was required and obtained: consent was required and obtained

## IPD sharing plan summary

Available on request

## Study outputs

Output type

[Results article](#)

Details

Date created

26/09/2025

Date added

05/05/2026

Peer reviewed?

Yes

Patient-facing?

No