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PREMOLAR EXTRACTION'S IMPACT ON MANDIBULAR ROTATION

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ABSTRACT

Background
In orthodontics, premolar extraction is a frequent therapeutic method. Premolar extraction is justified by the need to make room for crowded teeth to be realigned and, more specifically, for a camouflage treatment of class II malocclusion. It is normal procedure to extract all first premolars as part of fixed orthodontic treatment in order to create room for proclination correction or crowding relief. The goal of orthodontic mechanics should be to prevent posterior teeth from extruding and to intrude of anterior teeth.
Objectives- This study compared the mandibular rotation changes of subjects who had all of their first premolars extracted after receiving fixed orthodontic treatment.

Materials and Methods
The samples were chosen only after the course of treatment was finished because the study was retrospective in nature. Based on patient information from Department of Dentistry,Jawaharlal Nehru Medical College and Hospital (JNMCH), Bhagalpur, Bihar, India.Two years' worth of data, from January 2023 to January 2025, have been collected. Twenty participants' data were collected.

Results
A p-value of 0.02 indicated that the ratio between pre- and post-treatment was statistically significant. On the days of SN-Go-GN, Frankfort-mandibular plane angle (FMA), anterior facial height (AFH), and posterior facial height (PFH), no discernible variations were found between them, respectively.

Conclusion
The study found that there was no discernible change in the FMA or SN-GoGn angle between the pre- and post-tests. There were a few differences in anterior and posterior facial height before and after therapy. Jaraback's ratio did not significantly change before or after treatment. To maintain the vertical dimension stable, it might be proposed that the proper mechanics, as per growing rotation, must be adhered to.

Recommendations
To see changes before and after therapy, more research with a bigger sample size that is split according to growth pattern is required.

Keywords: *Planmeca proline XC, Orthodontics, Cephalograms, Molar extraction, Mandibular function*
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INTRODUCTION

In orthodontics, premolar extraction is a frequent therapeutic method. Premolar extraction is justified by the need to make room for crowded teeth to be realigned and, more specifically, for a camouflage treatment of class II malocclusion [1]. Since the beginning of orthodontics, there has been discussion about the convenience of premolar extraction, therefore, this procedure has not been without controversy. According to certain researchers, extraction results in a more effective and stable treatment with less need for patient compliance because people with significant antero- posterior discrepancies or arch space deficiencies do not represent a risk factor for temporomandibular joint (TMJ) disorders [2, 3].
The same rate of crowding and relapses after orthodontic

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treatment, with or without premolar extraction treatment, is expected, according to other studies [4, 5, 6]. For retraction of maxillary anterior teeth in extraction instances, the orthodontist has experimented with several gadgets [7].

Preserving vertical stability to stop mandibular rotation backward and downward is the major goal of anterior tooth retraction in extraction circumstances. With downward and backward rotation of the jaw, subjects with skeletal class II malocclusion and a retrognathic mandible may appear more retrognathic if the mandibular plane angle expands during treatment. Rotating the mandible backward and downward in a vertical grower can also accentuate an open bite, making it less aesthetically pleasing. After orthodontic treatment is finished, any negative alterations in the mandibular angle have an impact on balance and appearance.

It is normal procedure to extract all first premolars as part of fixed orthodontic treatment in order to create room for proclination correction or crowding relief. The goal of orthodontic mechanics should be to prevent posterior teeth from extruding and to intrude of anterior teeth. In adult patients having all of their first premolars extracted, this will prevent the mandibular angle from opening [8].

This study compared the mandibular rotation changes of subjects who had all of their first premolars extracted after receiving fixed orthodontic treatment.

METHODOLOGY

Study Design

The samples were chosen only after the course of treatment was finished because the study was retrospective in nature. Based on patient information from Department of Dentistry,Jawaharlal Nehru Medical College and Hospital (JNMCH), Bhagalpur, Bihar, India.Two years' worth of data, from January 2023 to January 2025, have been collected.

Study Population

Twenty participants' data was collected. Participants had to be adults, over the age of 18, have all of their first premolars extracted, and have improved profiles both during and after treatment to be eligible. Participants were excluded if they had previously received orthodontic treatment, had undergone orthognathic surgery, or had used any other retraction technique, such as headgear.

Study Procedure

A distance of 60 inches separated the subjects. A CD-ROM was used to capture a soft copy of the lateral cephalogram. Tracing and analyzing the lateral cephalogram was done using Nemoceph, a dental studio version 6.0. The head film that was utilized was 8 by 10 inches in size. Using accepted procedures, lateral cephalograms were obtained. It was possible to produce a lateral cephalogram with the head in its natural position, with the lips relaxed and the teeth in a closed position. Soft copies of lateral cephalograms were transferred to a computer running Planmeca software. After that, the digital lateral cephalogram was duplicated to a CD-ROM and saved as a bitmap file.

The (nemotec) software's calibration tool was used to detect the cross hairs on the lateral cephalogram, which were spaced 10 mm apart. Following the usage of the software's image- enhancing features, such as brightness, contrast modification, and magnification, landmarks were identified as precisely as feasible for each cephalometric landmark. Both the pre- and post- treatment cephalograms' landmarks were marked using the laptop's built-in touchpad.

Statistical Analysis

The data was entered into a Microsoft Excel data sheet and then evaluated using Statistical Presentation System Software (SPSS) version 26.0. Continuous data were described using the mean and standard deviation. To ensure a sufficient comparison, a paired t-test was employed. A statistically significant value was defined as one that was less than 0.05.

RESULTS

Table 1 represents a comparison of results on different days. A p-value of 0.02 indicated that the ratio between pre- and post-treatment was statistically significant. On the days of SN-Go-GN, Frankfort-mandibular plane angle (FMA), anterior facial height (AFH), and posterior facial height (PFH), no discernible variations were found between them, respectively.

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Table 1. Comparison of results on different days

Days	Pre-treatment	Post-treatment	P-Value
SN-Go-GN	26.4±7.8	27.1±7.1	0.76
FMA	22.3±5.7	22.1±7.8	0.92
AFH	105.9±20	104.9±31	0.90
PFH	71.8±8.9	70.9±7.9	0.73
Ratio	65.9±3.1	68.3±3.5	**0.02**

Mean±SD was used to display the data.
A statistically significant value was defined as one that was less than 0.05.

DISCUSSION

Examining the relationship between premolar extraction cases and changes in mandibular plane angle before and after treatment was the aim of this investigation. The facial patterns did not significantly alter once they were established [8].

In his research, Bishara concluded that adulthood was when facial type distinctions were most noticeable. Although not all of the growing changes in the face tissues were completed, studies have shown that most of them occurred before the age of 18, which is why samples of persons older than 18 were included [9]. The current study's findings showed that in participants who had premolar extractions, the vertical dimension did not change substantially before and after treatment.

Previous investigations have shown that there was no significant increase in the vertical dimension between premolar extraction and non-extraction instances. These authors assert that the vertical dimension did not collapse as a result of extraction, in contrast to non-extraction circumstances. For the current investigation, the mandibular plane angle remained constant in extraction cases [10, 11, 12, 13, 14, 15].

Comparing SNGoGn to post-treatment data, Alhajeri-K reported a non-significant decline, which is similar to the current study. Additionally, he revealed conflicting findings on anterior face height, which in this study indicated a significant rise, while in the current study it was non-significant [16].

When all of the first premolars were removed from subjects with an open bite, Aras A. et al. saw no appreciable alteration in the mandibular plane [17]. In post-treatment tracing, patients with hyperdivergent development patterns demonstrated a significant increase in mandibular plane angle, according to Dwivedi et al [18].

Despite the heterogeneous nature of the study's sample, there was no appreciable difference in mandibular rotation between the pre- and post-treatment phases. Therefore, it is suggested that a proper approach based on the development pattern must be followed in order to preserve the vertical dimension and prevent deformation of facial aesthetics.

CONCLUSION

The study found that there was no discernible change in the FMA or SN-GoGn angle between the pre- and post-tests. There were a few differences in anterior and posterior facial height before and after therapy. The ratio between pre- and post-treatment was statistically significant, as evidenced by a p-value of 0.02. To maintain the vertical dimension stable, it might be proposed that the proper mechanics, as per growing rotation, must be adhered to.

LIMITATIONS

The limitations of the study include that the study was retrospective. additionally, as the cases of mandibular extraction were less prevalent, the duration of the study was shorter for if data for a longer duration had been collected, it could have reported significant results.

RECOMMENDATIONS

To see changes before and after therapy, more research with a bigger sample size that is split according to growth pattern is required.

LIST OF ABBREVIATIONS

TMJ- Temporomandibular joint
SPSS- Statistical Presentation System Software
JNMCH- Jawaharlal Nehru Medical College and Hospital
FMA- Frankfort-mandibular plane angle
AFH- Anterior Facial Height PFH- Posterior Facial Height

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