ISSN 2717-4913

Vol. 3 No. 1 Issue 4 Jan - Jun 2022

# JKDC

## Journal of Kantipur Dental College

Biannual

Peer reviewed

Open access


www.kantipurdental.edu.np

An Official Publication of Kantipur Dental College

Affiliated to Kathmandu University, Recognized by Nepal Medical Council

ISSN 2717-4913

Vol. 3 No. 1 Issue 4 Jan - Jun 2022

JKDC

Journal of Kantipur Dental College

Biannual

Peer reviewed

Open access



The Journal of Kantipur Dental College is a peer reviewed open access journal published biannually. The journal deals with the applied and theoretical researches in the field of dentistry and other health sciences.

The ideas and opinions expressed by authors represents the views of the authors and do not necessarily represent the official views of the Kantipur Dental College and Editorial Board of the Journal, unless so specified.

The journal does not charge article processing or submission fees.

In case of any conflict of opinion or disagreement, decision of the Chief Editor will be the final.



Kantipur Dental College Teaching Hospital & Research Center

Address : Basundhara Ring Road (Near Police Bit), Kathmandu-3, Nepal

Tel No. : 977-01-4385910, 4385911 (Hospital)
: 977-0-14366242/4358586 (College)

Toll Free No. : 16600171111

Fax : 977-01-4385912

Email : kdchktm@gmail.com

Website : www.kantipurdental.edu.np

**Manuscript Submission Email : jkdcjournal@gmail.com**

**Journal Website : www.kantipurdental.edu.np/journal**

**Design** Binesh K Maharjan
Color & Pixel Pvt. Ltd.
www.colornpixel.com

# Contents


## Editorial

| | |
|---|---|
| Citing the Citation<br>*Dr Sujita Shrestha* | 5 |

## Research Article

| | |
|---|---|
| Knowledge, Attitude and Practice of Pharmacovigilance and Adverse Drug Reaction Reporting among Dental Students<br>*Aastha Shrestha, Nisha Jha, Pathiyil Ravi Shankar, Nirjala Laxmi Madhikarmi* | 6 |
| Comparison of Alkalinised and Non-alkalinised Lignocaine on Pain and onset of Anesthesia during Intra-oral Injection<br>*Dr Satya Priya Shivakotee, Dr Sumit Singh, Dr Lokesh Verma* | 12 |
| Cephalometric Comparison of Collum Angle in Horizontal and Vertical Growth Patterns<br>*Dr Dipankar Shrestha, Dr Rabindra Man Shrestha, Dr Jyoti Dhakal, Dr Asal Acharya, Dr Shreya Bajracharya* | 17 |
| Relationship of Occlusal Planes and Growth Patterns in Skeletal Class I Malocclusion<br>*Dr Prafen Pokhrel, Dr Rabindra Man Shrestha, Dr Jyoti Dhakal, Dr Ujjwal Pyakurel, Dr Amita Lama* | 21 |
| Knowledge, Attitude and Practice in Dental Hygiene Aids among Undergraduate Students of Different Fraternities<br>*Dr Sarahana Shrestha, Dr Sadikchya Pokhrel, Dr Reshma Karki* | 26 |

## Case Report

| | |
|---|---|
| Hemisection of Mandibular Molar: A Conservative Approach for Management of Perio-Endo Lesion<br>*Dr Binita Shrestha, Dr Sandhya Shrestha, Dr Kamana Neupane* | 34 |
| Prosthetic Rehabilitation of a Patient with an Ocular Defect: A Simplified Clinical Approach<br>*Dr Rewant Rajbhandari, Dr Barsha Ghimire, Dr Saishab Dhital, Dr Sunita Prajapati* | 38 |
| A Customized Post and Core on Structurally Compromised Endodontically Treated Tooth<br>*Dr Sunita Prajapati, Dr Dinesh Sharma Bhusal, Dr Rewant Rajbhandari* | 41 |

## Student KDC

| | |
|---|---|
| Prevalence of Oral Diseases in Rural Area of Punjab, India<br>*Dr Arshnoor Singh Bajaj, Dr Harmandeep Kaur* | 44 |

| | |
|---|---|
| Author Guideline | 46 |

# Citing the Citation

Dr Sujita Shrestha
Chief Editor

"Citation" means a document that quotes someone publicly for something the person has performed. In research, citation is the approach to inform readers that certain material or work has come from another source which is documented serially. It gives necessary detail information of that source or reference and provides an important roadmap of the research process. Citing is important because it gives credit to the intellectual work of an individual and prevents plagiarism by sincerely reporting the sources. Authors should provide citation by using the exact quote and restate or paraphrase the statement of the other's work. Citations are expressed in the form of parentheses and citing sources are; in-text citation, parenthetical citation, footnotes or endnotes. Author should strictly follow the journal's reference style and format for in-text citations and listing the references i.e. authors' names, journal title, article title, publication year, volume issue (number), and page number. Thus, the precise citation improves the quality of manuscript and helps to deliver a good research.

Citation should be accurate and accessible to the readers, reviewers and editors. It is necessary to read full text or manuscript before citing the manuscript. Recently, citation index has been developed; which is bibliographic database based on the number of citations received from others' publications. Citations are used to measure the importance of information source and enable to gather data on impact of the study. Bibliometrics are the applications used to measure an impact of the scientific paper. Citation analysis is most commonly used bibliometric methods. In citation analysis; data from citation indices will be evaluated to determine the impact of specific articles, authors and research publications. Common citation analyses are: ***1. Citation Count*** - number of times an article is cited by other articles and also shows the quality and influence of the article. ***2. Hirsch index (H-index)*** - developed by Hirsch, which measures productivity and impact of the published work. H-index is calculated as the product of a researcher with n-number of papers and n-number of citations. For example; if a researcher with an h-index of 8 means that among all publications, 8 publications have at least 8 citations each. ***3. i10 index*** - developed by Google Scholar and defined as the number of publications with minimum of 10 citations or more. It allows researchers to keep track of their own citations. ***4. Download counts*** - number of times article is cited by other articles. Access to articles is faster due to online publishing and recent analysis showed that download counts are easy interpreter of citations. ***5. KeyWords Plus*** – citation based method introduced by Institute for Scientific Information (ISI). Title words, key-words and phrases are used to retrieve scientific articles.

The advanced digital technology with multiple sources has made easier to present the evidence; however citing the manuscript or article without reading completely can lead to false interpretation. Duplicating the references from other paper without reading full manuscript can affect the credibility and there are many types of metrics to measure the impact of the research. The metrics can be at article-level, author-level and journal-level therefore citation database and citation analysis are potential indicators to measure the impact of scientific article. Citation is a key element of the research which is used to judge the quality of work done by the researcher hence the use of updated citation method is recommended.

JKDC

## SOURCES

1. Nigam A, Nigam PK. Citation Index and Impact factor. Ind J Dermatol Venereol Leprol. 2012;78:511-16.
2. Aksnes DW, Langfeldt L, Wouters P. Citations, Citation Indicators, and Research Quality: An Overview of Basic Concepts and Theories. SAGE Open. 2019;9(1).
3. Hirsch JE. An index to quantify an individual's scientific research output. Proc Natl Acad Sci USA. 2005;102(46):16569-72.
4. Masic I. The importance of proper citation of references in biomedical articles. Acta Informatica Medica. 2013;21(3):148-55.

# Knowledge, Attitude and Practice of Pharmacovigilance and Adverse Drug Reaction Reporting among Dental Students

Aastha Shrestha,[1] Nisha Jha,[2] Pathiyil Ravi Shankar,[3] Nirjala Laxmi Madhikarmi[4]

[1]Department of Pharmacology, Kantipur Dental College and Hospital, Basundhara, Kathmandu, Nepal
[2]Department of Pharmacology, KIST Medical College, Lalitpur, Nepal,
[3]IMU Centre for Education, International Medical University, Kuala Lumpur, Malaysia
[4]Department of Biochemistry, Kantipur Dental College and Hospital, Basundhara, Kathmandu, Nepal

**Corresponding Author**
Ms Aastha Shrestha
Email: aasthakdch@gmail.com

**Citation**
Shrestha A, Jha N, Shankar PR, Madhikarmi NL. Knowledge, Attitude and Practice of Pharmacovigilance and Adverse Drug Reaction Reporting among Dental Students. J Kantipur Dent Coll. 2022;3(1):6-11.

## ABSTRACT

**Introduction:** Pharmacovigilance plays a key role in identifying adverse drug reactions (ADR). The under reporting of ADR by health care professionals is the major drawback for the success of pharmacovigilance program. The dental students are the future prescribers who can play a major role in strengthening the program. The objective of the study was to evaluate the knowledge, attitude, and practice (KAP) of dental students about pharmacovigilance and ADR reporting.

**Materials and Methods:** A descriptive cross-sectional study was conducted among the third, fourth, final year BDS students and interns of Kantipur Dental College. The study was conducted on January- March 2021 using a structured online questionnaire. A convenience sampling method was used. The median scores were calculated and compared among different subgroups.

**Result:** A total of 118 students participated in the study. The median attitude score was significantly higher among respondents 20-22 years age group (p=0.003). The total median KAP score was also higher among 20-22 years age group. Most of the students 112 (94.9%) atleast knew the definition of adverse drug reactions.

**Conclusion:** The study showed that students had moderate knowledge and inadequate practice but had positive attitude toward pharmacovigilance. This study highlights the need on awareness about pharmacovigilance among dental students to improve reporting of ADRs and increase the number of reported ADRs.

**Keywords:** adverse drug reaction; attitude; dentists; knowledge; pharmacovigilance.

## INTRODUCTION

Medicines have contributed substantially to treating diseases in the modern era. The use of medicine not only results in beneficial effects but can also cause some unexpected or noxious effects known as adverse drug reactions (ADR). There is a worldwide concern about increasing number of adverse effects caused by drugs.[1] Studies have reported, adverse drug reactions (ADR) as an important cause of morbidity and mortality.[2] Around 0.2% to 41.3% of emergency hospitalization were due to ADRs, and 28.9% of these were preventable.[3] Hence, adverse drug reaction reporting and monitoring is very essential to identify and minimize the adverse reactions and prevent harm to the patients.

Spontaneous reporting of ADRs is an integral part of pharmacovigilance. But under-reporting is the major threat to pharmacovigilance (PV) programs. Study reported that the rate of under-reporting was about 94% and only 6-10% of all ADRs were reported.[4]This may be due to a lack of knowledge and awareness regarding detection, communication and spontaneous monitoring of ADRs among the health care providers including physicians, dentists, pharmacists, and nurses. The risk of ADRs cannot be neglected in dentistry as dentists prescribe antibiotics, analgesics, anti-inflammatory drugs and use local anaesthetics during surgical inventions. As a future practitioner and being an important part of the health care system, dental students must be trained to recognize and report ADRs spontaneously. Many studies have been conducted to assess the knowledge, attitude, and practice (KAP) regarding PV among the health care professionals (HCP) and dentists but none of the studies have been conducted among the dental students in Nepal. The objective of this study was to evaluate the KAP of dental students towards PV and ADR reporting in a private dental college.

## MATERIALS AND METHODS

A cross-sectional questionnaire-based study was conducted at Kantipur Dental College Teaching Hospital and Research Centre from January to March 2021among

the third, fourth, final year dental students and interns. Ethical approval was obtained from the institutional review board of the college (Reference Number: 41/020). The convenience sampling method was used to collect the data.

A previously validated questionnaire was used and modified according to the need of the present study.[3,5-7] Due to the COVID-19 pandemic all face-to-face college activities were suspended so it was not possible to collect the response directly from the students. Hence, a structured online questionnaire was used. The data was collected after taking the respondents' consent online and questionnaire was sent via the social networking sites. Online sessions were conducted for each batch of students to explain the objectives of the study. The time for completing the questionnaire was 30 minutes. The questionnaire included demographic details such as; age, gender and year of study. Section I contained 10 questions to evaluate participants' knowledge of ADR reporting and PV. Each question had a single correct response. The correct response was scored 1 and wrong response was scored 0. The second section contained 5 questions related to the attitude of the participants which were measured using a 5-point Likert scale (viz 5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree). The third section had 5 questions related to the practice of ADR reporting measured using Yes/No.

The response obtained was analysed using IBM SPSS version 21. Descriptive statistical analyses; frequencies and percentages were used to represent the respondents' demographic information. One sample Kolmogorov Smirnov test was used to test the normality of the data. The number and percentage of respondents with correct answers to knowledge and practice questions were calculated. The median scores were compared among subgroups of respondents using appropriate statistical tests and p-value less than 0.05 was taken as statistically significant.

## RESULT

A total of 118 students participated in the study. The knowledge, attitude, and practice score among the different subgroups of the respondents were compared. The median knowledge score was not statistically significant among the different subgroups. The median attitude score was found to be significantly higher for the students aged 20-22 years as compared to the age group of 23-27 years (p=0.003). Similarly, the median total KAP scores were found to be significantly higher for the same group of respondents (p<0.001) (Table 1).

Most of the respondents 112 (94.9%) knew the definition of ADR. One hundred and four (88.1%) of the study participants knew that the department of drug administration (DDA) is the regulatory body responsible for monitoring ADR in Nepal. However, only 18 (15.3%) were aware of the existence of the national pharmacovigilance program. In our study 77 (65.3%) students have come across an ADR during their clinical posting but only 6 (5.1%) had reported an ADR to the pharmacovigilance centre (Table 2).

Out of 118 students, females were more 80.5% as compared to males 19.5% and this may be because more female

**Table 1: Median scores and interquartile range for different variables among subgroups of respondents**

| Characteristics | | Median knowledge scores (IQR) | P value | Median attitude scores (IQR) | P value | Median practice scores (IQR) | P value | Median total scores (IQR) | P value |
|---|---|---|---|---|---|---|---|---|---|
| Age | 20-22 years | 6 (2) | 0.040 | 24 (2) | 0.003 | 1 (2) | 0.912 | 31 (3) | <0.001 |
| | 23-27 years | 6 (3) | | 23 (3) | | 1 (1) | | 30 (4) | |
| Gender | Female | 6 (2) | 0.139 | 24 (3) | 0.605 | 1 (2) | 0.056 | 30 (4) | 0.081 |
| | Male | 6 (2) | | 23 (3) | | 1 (1) | | 32 (2) | |
| BDS Year | 3rd year | 6 (2) | 0.623 | 24 (2) | 0.201 | 1 (1) | 0.907 | 31 (3) | 0.133 |
| | 4th year | 6 (2) | | 23.5 (2) | | 1 (2) | | 31 (3) | |
| | 5th year | 5 (3) | | 24 (3) | | 1 (1) | | 31 (4) | |
| | Interns | 6 (2) | | 23 (3) | | 1 (2) | | 30 (4) | |

**Table 2: Respondents correct answer to the statements for knowledge and practice (n =118)**

| Knowledge & Practice Statement | n (%) |
|---|---|
| Pharmacovigilance deals with | 83 (73.3) |
| The main aim of Pharmacovigilance is | 79 (66.9) |
| ADR is defined as | 112 (94.9) |
| The health care professionals responsible for reporting ADRs in hospital is/are | 90 (76.3) |
| Which regulatory body is responsible for monitoring ADR in Nepal? | 104 (88.1) |
| The international center for monitoring adverse drug reaction is located in | 52 (44.1) |
| Do you know the existence of a National Pharmacovigilance program in Nepal? | 18 (15.3) |
| Which of the following scales is most commonly used to establish the casuality of an adverse drug reaction? | 45 (38.1) |
| Which one of the following is the WHO online database for reporting ADR? | 54 (45.8) |
| Rare ADR can be identified during which phase of a clinical trial? | 43 (36.4) |
| Have you anytime read an article on prevention of ADRs? | 49 (41.5) |
| Have you ever seen any patient experiencing an ADR? | 77 (65.3) |
| Have you ever seen the ADR reporting form? | 6 (5.1) |
| Have you ever reported ADR to the pharmacovigilance center? | 6 (5.1) |
| Have you ever been trained on how to report adverse drug reaction? | 7 (5.9) |

**Table 3: Demographic characteristics of respondents (n =118)**

| Characteristic | | n (%) |
|---|---|---|
| Gender | Female | 95 (80.5) |
| | Male | 23 (19.5) |
| Age (in years) | 20-22 years | 47 (39.8) |
| | 23-27 years old and above | 71 (60.2) |
| BDS Year | 3rd year | 34 (28.8) |
| | 4th year | 34 (28.8) |
| | 5th year | 26 (22.0) |
| | Interns | 24 (20.3) |

students are being admitted to the dentistry program in Nepal. Most of the participants 71 (60.2%) were of age 23 -27 years and students from the third and fourth year BDS students were more 28.8% (Table 3).

## DISCUSSION

This study evaluated the KAP of dental students about ADR reporting and pharmacovigilance. Though numerous studies have been conducted among medical professionals and students, our study focused on the dental students. As dentistry is an important aspect of health care and dentists also prescribe and use medicines such as local anaesthetics, antibiotics, analgesics and anti-inflammatory drugs, etc. all of which can cause ADRs, hence the risk of ADR cannot be ignored in dentistry and the contribution of dentists in improving spontaneous reporting cannot be underestimated.[8] The total median KAP score of the respondents was moderate which is similar to the study done by Chhabra et al.[9] In contrast to our study, the KAP score was low in studies done by Palaian et al.[7]

The main aim of pharmacovigilance is to ensure the patients' safety and the rational use of medicines. The important outcome of pharmacovigilance is to prevent the patients from being affected by the unnecessary negative consequences of medicinal therapy.[10] Under-reporting of ADRs is a common problem in pharmacovigilance programs. The effectiveness of any PV program depends on the participation of all HCPs, and dentists are crucial HCPs for pharmacovigilance activities and ADR reporting. Increased awareness about ADRs among them can improve ADR reporting.

The knowledge score in our study was low which is similar to other studies.[8,9,11] In contrast, other researchers have

observed moderate knowledge scores.[6,12,13] The median knowledge scores were also compared among subgroups of respondents according to the demographic variables like age, gender, and level of qualification, though no significant difference was obtained. In terms of age, both the younger (20-22 years) and older (23-27 years) age group had the same level of knowledge. In the younger age group, most of the students had just completed their basic sciences and had been taught about ADRs and PV topics in their pharmacology classes. However, the older age groups are not exposed to the ADR reporting and pharmacovigilance program. Our college does not have a pharmacovigilance centre because of which the students are unaware of ADR reporting and the significance of pharmacovigilance. In the United Kingdom and United States, most medical and dental schools have introduced sessions on the ADR reporting system in the undergraduate syllabus and their skills are also assessed, due to which they have better knowledge scores.[14,15] In most developing countries including Nepal, the pharmacovigilance program is still at the nascent stage, and this could have contributed to the low knowledge score. To facilitate the activity of PV, it has now become essential to include the Pharmacovigilance activities and ADR reporting system in the early undergraduate curriculum.

A better attitude score among the study participants in this study demonstrates their willingness to contribute to the pharmacovigilance program. A significant difference was seen between the younger and older age group. This indicates that the younger groups are more enthusiastic about being involved in PV-related activities and are aware of the importance of ADR reporting. Comparison with the results of various studies among health care professionals also showed similar findings.[16,17]

The practice score was low among the study participants which correlates with the study done by Gupta et al, Rani et al and Datta et al.[6,18,19] This low score can be attributed to the fact that even though they were taught about ADR and Pharmacovigilance during their Pharmacology class, they were not trained to apply this knowledge in practice. Information about the national pharmacovigilance program and its centre and ADR monitoring should be included in the curriculum. Visiting a pharmacovigilance centre, studying its operations, and undertaking the task of completing the ADR reporting form and ADR causality assessment should be included in the practical curriculum.[20]

Among the three groups, the median total KAP score was significantly higher among the age group of 20-22 years. This could be explained as the younger age group has just completed their basic science courses as mentioned before; also, they had a better attitude as compared to other subgroups. Knowledge is an important factor that influences attitude and practice. With better knowledge and a positive attitude toward ADR reporting, many interventions can be done such as workshops and seminars to strengthen the system and improve the ADR reporting culture in Nepal. Participants' knowledge regarding the various aspects of PV was average to low. The maximum number of students knew about the definition and aim of pharmacovigilance (73.3% & 66.9%). This result is consistent with the findings by Datta et al and Era et al[19,21] but is greater in comparison to the study by Rani et al (41%) in Hyderabad and Vakade et al (34%) in Ahmednagar, India.[18,22] Similarly, 94.9 % of the respondents gave the correct response for the definition of ADR. Our result correlates with other studies.[20] For the location of the international centre for monitoring of ADR and the existence of the National Pharmacovigilance program in Nepal, more than half of the participants did not have any idea about it. Our result is consistent with the study conducted by Garg et al and Parthasarthi et al.[23,24]

The result obtained in our study regarding the practice demonstrated that there was a huge gap between ADRs encountered and ADRs being reported. 65.3% of the participants had come across an ADR during their posting in clinical OPD but only 5.1% had ever reported an ADR to the PV centre. Various studies done among the medical undergraduates and health care professionals had also revealed a huge difference in ADRs encountered and reported. Era et al revealed that 50% of their respondents encountered ADRs but only around 20% were reported.[21] Similar studies done by Kumari M et al, Meher at al, Gaude at al, Datta S et al showed 75%, 60%, 38.9% 50%, 75% have encountered ADRs among the patients; nevertheless only 25%, 10%, 6.3%, 2.27% 4% had ever reported ADR to a pharmacovigilance center.[25-28] In countries like England and Sweden, the reporting rate is as high as 70% as reporting is mandatory there.[29,30]

Under-reporting can be addressed with the coordination and integration of specialists like pharmacologists, skilled physicians, and dentists about PV and ADR reporting. Along with these, strict implementation of legislative norms concerning reporting of ADR can boost spontaneous reporting.

The study was conducted only in one institution so the result obtained cannot be generalized to all the dental

students. Information was collected using a questionnaire and was not triangulated with that obtained from other sources.

## CONCLUSION

Our students had moderate knowledge and inadequate practice but have a better attitude toward Pharmacovigilance and ADR reporting. There is an urgent need for the inclusion of PV and ADR reporting in the dental curriculum not only on the theoretical aspects but also on practical implications of the same. This should be incorporated from the first year of study. This will make them aware of pharmacovigilance and ADRs which will certainly help them realize that all medicines can cause adverse effects. Moreover, by participating in the workshop, and seminars conducted in coordination with the national pharmacovigilance program, they can detect and be able to report any adverse effects. This will help in reducing the rate of underreporting of ADR Also, the positive attitude of the study participants in the present study can be important for the success of PV activities among dentists in Nepal.


## ACKNOWLEDGEMENT

The authors would like to acknowledge all the participants of this study and also thankful to Ms Nabina Miya for her cooperation during the study.


## REFERENCES


1. Jha N, Rathore DS, Shankar PR, Gyawali S, Hassali MA, Alshakka M, et al. Strengthening adverse drug reaction reporting in Nepal. Asian J of Med Sciences. 2015;6(4):9-13.
2. Hardeep, Bajaj JK, Kumar R. A survey on knowledge, attitude and practice of pharmacovigilance among the health care professionals in a teaching hospital in Northern India. J Clin Diag Res. 2013;7(1):97-9.
3. Srinivas M, Sharma SN, Holla R. Knowledge, attitude and practice of medical professionals towards adverse drug reaction reporting and pharmacovigilance in a tertiary care hospital: a cross sectional study. Int J Basic Clin Pharmacol. 2018;7(3):486-93.
4. Ray D, Venugopal A. An Evaluation of knowledge, attitude and practice of pharmacovigilance among the prescribers of a medical college hospital in North Eastern State of India: A cross sectional study. Ind J Pharmacy and Pharmacol. 2015;2(4):183-90.
5. Jadhav A, Chandrikapure A, Tarte P. Pharmacovigilance in dental practice: A study to evaluate knowledge, attitude and practices (KAP) of reporting of adverse drug reactions (ADR) among the dental practitioner in a city of Central region of Maharashtra, India. MedPulse – Int J of Dent. 2017;2(2):14-8.
6. Gupta A, Srivastava B, Bhardwaj R, Khanchandani R. Knowledge, Attitude and Practice (KAP) of pharmacovigilance among undergraduate medical students in a tertiary care teaching hospital of Kumaon Region, Uttarakhand. IJSR. 2019;8(4): 9-10.
7. Palaian S, Ibrahim MI, Mishra P. Health professionals' knowledge, attitude and practices towards pharmacovigilance in Nepal. Pharm pract. 2011;9(4):228-235.
8. Khan SA, Goyal C, Tonpay SD. A study of knowledge, attitude and practice of dental doctors about adverse drug reaction reporting in a teaching hospital in India. Perspect Clin Res. 2015;6(3):144-149.
9. Chhabra KG, Sharma A, Chhabra C, Reddy JJ, Deolia SG, Mittal Y. Knowledge, attitude and practices regarding pharmacovigilance and adverse drug reaction reporting among dental students in a teaching hospital, Jodhpur, India: A cross sectional study. J Contemp Dent Pract. 2017;18(10):964-69.
10. Oisson S. The need for pharmacovigilance In: Gupta SK. Pharmacology and therapeutics in the new millennium. Narosa publishing house, New Delhi. 2001;502-8.
11. Shalini S, Mohan S. Knowledge and Attitude towards pharmacovigilance and adverse drug reaction reporting among dental students in a Private University, Malaysia. J Young Pharm. 2015;7(2):118-25.
12. Okezie EO. Adverse drug reaction reporting by physicians in Ibadan, Nigeria. Pharmacoepidemiol Drug Saf. 2008;17(5):517-22.
13. McGettigan P, Golden J, Conroy RM, Arthur N, Feely J. Reporting of adverse drug reactions by hospital doctors and the response to intervention. Br J Clin Pharmacol. 1997;44(1):98-100.
14. Bateman DN, Sanders GL, Rawlins MD. Attitude to adverse drug reaction reporting in the Northern Region. Br J Clin Pharmacol. 1992 ;34(5):421-26.
15. Cox AR, Marriot JF, Wilson KA, Ferner RE. Adverse drug reaction teaching in UK undergraduate medical and pharmacy programmes. J Clin Pharm Ther. 2004;29(1):31-5.
16. Torwane AN, Sudhir H, Gouraha A, Jain S, Chavan K, Dayma A. Assessment of knowledge, attitude and practice related to pharmacovigilance among the healthcare professionals in a teaching hospital in Central India: an questionnaire study. World J Pharm Pharm Sci. 2015;4(4):785-99.
17. Kunoor NS, Sharanabasappa S, Lohit K. Perception of doctors towards adverse drug reaction (ADR) reporting: a cross sectional survey using a validated questionnaire. Int J Basic Clicinal Pharmacol. 2017;6(11):2671-75.
18. Rani V, Shyamala R, Simpson GB. A cross sectional study evaluating the knowledge, attitude of undergraduate medical students about pharmacovigilance and adverse drug reaction reporting at a medical college in Hyderabad. Asian J Pharm Clin Res. 2017;10(7):239-42.
19. Datta D, Giri VP. A questionnaire study on knowledge, attitude and practice of pharmacovigilance among the medical post graduates in a teaching hospital in West Uttar Pradesh. Int Arch Bio Med Clin Res. 2017;3(2):25-31.

20. N.G. H, K.B. B, Sangeetha .Pharmacovigilance: The Extent of the Awareness among the Final Year Students, Interns and Postgraduates (PGs) in a Government Teaching Hospital.J Clin of Diagn Res. 2012; 6(7):1248-53.

21. Era N, Mukherjee S, Bordoloi SK. Assessment of knowledge, attitude and practice of pharmacovigilance among undergraduate medical students in a tertiary care teaching hospital of eastern India: A questionnaire based study. Natl J Physiol Pharm Pharmacol. 2020;10(6):460-63.

22. Vakade KP, Sangisetti VM, Binayke MV, Abhavathi VN, Nayak BB. An evaluation of knowledge, attitude and practice of pharmacovigilance among interns in a tertiary care teaching hospital of North Maharashtra. Int J Basic Clin Pharmacol. 2016;5(6):2321-5.

23. Garg P, Sharma V, Bajaj JK. Assessment of knowledge, attitude and practice of pharmacovigilance among the interns in a tertiary care hospital in Northern India – a questionnaire based study. Int J Med and Dent Sci. 2017;6(2):1498-1503.

24. Ramesh M, Parthasarathi G. Adverse drug reaction reporting: attitudes and perceptions of medical practioners. Asian J Pharm Clin Res. 2009;2:10-4.

25. Kumari M, Choudhary AK. Comparative study and assessment of the knowledge, attitude and practice of pharmacovigilance among first, second and third professional medical students of PMCH, Dhanbad. Int J Basic ClinPharmacol. 2020;9(9):1386-91.

26. Meher BR, Joshua N, Asha B, Mukherji D. A questionnaire based study to assess knowledge, attitude and practice of pharmacovigilance among undergraduate medical students in a tertiary care teaching hospital of South India. Perspect Clin Res. 2015;6(4):217-21.

27. Gaude OS, Sa SD. Assessment of knowledge, attitude and practices of pharmacovigilance and adverse drug reaction reporting among final year medical students – a questionnaire based study in a tertiary care in Goa. Nat J Physiol Pharm Pharmacol. 2018;8(12):1657-61

28. Datta S, Shramana S. An evaluation of knowledge, attitude and practice of adverse drug reaction reporting in a tertiary care teaching hospital of Sikkim. Perspect Clin Res. 2015;6(4):200-6.

29. Ekman E, Backstrom M. Attitudes among hospital physicians to the reporting of adverse drug reactions in Sweden. Eur J Clin Pharmacol. 2009;65(1):43-6.

30. Belton K, Lewis SC, Payne S, Rawlins M, Wood S. Attitudinal survey of adverse drug reaction reporting by medical practioners in the United Kingdom. Br J Clin Pharmacol. 1995;39(3):223-26.

# Comparison of Alkalinised and Non-alkalinised Lignocaine on Pain and onset of Anesthesia during Intra-oral Injection

Dr Satya Priya Shivakotee,[1] Dr Sumit Singh,[2] Dr Lokesh Verma[3]

[1,2,3]Lecturer, Department of Oral and Maxillofacial Surgery, Kantipur Dental College and Hospital,Kathmandu, Nepal.

**Corresponding Author**
Dr Satya PriyaShivakotee
Email: drsatyapriyashivakotee@gmail.com

**Citation**
Shivakotee SP, Singh S, Verma L. Comparison of Alkalinised and non-alkalinised lignocaine on pain and onset of anesthesiaduring intra-oral injection. J Kantipur Dent Coll. 2022;3(1):12-6.

## ABSTRACT

**Introduction:** The acidic nature of commercial local anaesthetics (LAs) can cause pain during injection and delay the onset of anaesthesia. It is suggested that adjusting the pH of anaestheticagent could minimize these effects. The aim of the study is to assess the efficacy of alkalinised lignocaine on pain and onset of anesthesiaduring intraoralnerve block injection.

**Materials and Methods:** An experimental comparative study was carried out in patients requiring extraction visiting the department of Oral and Maxillofacial Surgery at Kantipur Dental college and hospital. Patients will be randomly divided into two groups of 40 each usingsimple random sampling technique. All patients will be given standard nerve blocks: inferior alveolar, lingual, and long buccal. The study was designed to assess the effect of alkalinisation of the lignocaine solution with sodium bicarbonate. One group of patients were given 2% lignocaine hydrochloride with adrenaline 1:80,000 and the another group of patients were randomly allocated to be given 8.4% sodium bicarbonate in a 1/10 dilution. Pain was measured on a Visual Analogue Scale (VAS).

**Result:** 26 Patients given the injection with sodium bicarbonate complained of no pain, 12 patients complained of mild pain and 1 patient with moderate pain compared with 34 patients complained with moderate pain and 6 patients with severe pain who were not given sodium bicarbonate ($p < 0.0001$). The mean (SD) time (seconds) to onset of local anaesthesia in the group given sodium bicarbonate was 1.39 compared with 3.33 in the control group ($p < 0.001$).

**Conclusion:** Our results have confirmed the efficacy of the alkalinised local anaesthetic solution in reducing pain on injection and resulting in quicker onset of anaesthesia.

**Keywords:** Alkalinisation; Lidocaine; Onset of anaesthesia; Pain; Sodium bicarbonate.

## INTRODUCTION

Local anesthetics (LAs) form is the backbone of pain control techniques andmost utilized drugs in dentistry.A Canadian study suggests that the average annual usage per individual dentist is about 1,800 cartridges of dental anesthetic, or nine cartridges per day for a dentist who practices 200 days per year.[1] The injection of local anesthetic agents into the skin and mucous membrane is one of the most common minor surgical maneuvers. Although it is short-lived, the perceived pain of the injection of local anaesthetic is terrible or intolerable for some patients to decline further interventions under local anesthesia. To give additionalanalgesicsor sedatives orboth, can be impractical, time consuming and at times contraindicated too.[2]The presence of acidity in the solution is thought to be important reasons for pain at the site of injection.Dentist's primary tool for pain management islocal anesthetic but acidity presence may contribute to lengthy anesthetic waiting periods and also cause the "bee sting effect" or burning and stinging during the injection.[3] Many dentists are surprised to know that the most widely used dental anesthetic solutions are formulated at the potential of hydrogen(pH) of lemon juice.[4]

Lidocaine is a local anesthetic of amide class that is available in a variety of concentrations. It is often combined with varying concentrations of epinephrine to prolong its actions and improve hemostasis.[5] Lidocaine is manufactured at pH of 5.0-7.0 which makes more soluble and stable and extends its shelf life to three to four years.[6] The pH of commercially available local anesthetics (LAs) is purposefully low (pH 3–4). Decrease in pH extends the shelf life of solution and prevents its early oxidation.[3] However, a low pH may produce a burning sensation on the injection site,slower onset of anesthesia anddecrease in its clinical efficacy.[2] Buffering of local anesthetics (alkalinization) by adding sodium bicarbonate has been suggested to achieve

better pain control, reduce pain on site of injection and produce faster onset of local anesthetics. The study aims to assess the efficacy of alkalinised lignocaine on pain and onset of anesthesiaduring intraoralnerve block injection.

## MATERIALS AND METHODS

An experimental comparative study was conducted after the approval by the Institutional ReviewCommittee of Kantipur Dental College. A total 80 healthy adult patients aged 18–55 years with written consent participated in the study. The patients who have to undergoextraction under local anaesthesia in the mandibular region presented to theDepartment of Oral and Maxillofacial Surgery at Kantipur Dental College and Hospital were included. Patient's age, sex and medical history of significant relevance were recorded andtreatment plan were explained. The inclusion criteria consisted of patients with American society of Anaesthesiology 1(ASA 1).Patients with known history of lignocaine allergy andany pre-existing systemic disease or condition were excluded from the study.

All the patients were given standard nerve blocks: inferior alveolar, lingual, and long buccal nerve.Patientswere divided into two groups, study and control; 40 in each group. Slips of paper containing numbers 1 to 80 were placed in one container. Each patient was asked to pick a slip and patient withodd numbers were allotted to control group and even numbers to study group. For control group; lignocaine hydrochloride with adrenaline 1:80,000 solution by injection was given. For study group; lignocaine hydrochloride with adrenaline 1:80,000 and sodium bicarbonate was added to the solution. A total of 8.4% sodium bicarbonate 3 ml was added to a 30 ml vial containing 2% lignocaine hydrochloride with 1:80,000 adrenaline solution, which yielded a 1/10 dilution.[7]

The procedures wereexplained to all thepatients. Both the operators and patients were unaware of which anaesthetic solution was administered to the patient. Anaesthetic solution were prepared and administered to the patient depending on the odd or evennumber picked by the patient (study and control group).The pain score was evaluated during injection and onset of anaesthesia in both the group. All injections in both groups were given using non-pyrogenic, non-toxic, sterile, single-use syringes with a luer lock and 25G (1.5 inch) needle. A maximum of 2.5 ml solution was used for all three blocks.

Pain score during injection was assessed using 4 point scale: 0 = no pain, 1 = mild pain (pain reported only in response to questioning and without any behavioural signs), 2 = moderate pain (pain reported in response to questioning and accompanied by signs, or pain reported spontaneously without questioning) and 3 = severe pain (strong vocal response or response accompanied by grimaces, withdrawal of the arm, or tears).[2] Pain during injection was defined as pain that was described by the patient on a four-point Visual Analogue Scale (VAS) during injection of the solution and not on the needle-prick.

The time of onset of anaesthesia is defined as the first sensation of numbness or tingling in the anaesthetised region. It was calculated from the point of retrieval of the needle after the injection. A straight probe was used to assess the onset of anaesthesia by inserting it in the gingival sulcus of the teeth in the area of anaesthesia. The results were quantified and analysed.

The pH of both solutions were evaluated using a standard pH meter; 3.05 was the measured pH for 2% lignocaine with 1:80,000 adrenaline (Jasocaine – A 2% , Jayson Pharmaceuticals, Bangladesh) and 7.38 for 2% lignocaine with 1:80,000 adrenaline with a 1/10 addition of 8.4% sodium bicarbonate.

Statistical analysis was done by using SPSS version 20. Shapiro- Wilk normality test was done and showed that the samples followed a normal distribution. Data for VAS were analysed using chi square test and time of onset of anaesthesia were analysed using Student's t-test. A probability of less than 0.05 was accepted as significant.

## RESULT

A total of 80 patients (33 males and 47 females), between the age 18 – 70 years old participated in the study.Based on gender, the mean time taken for the onset of local anesthesia in male patients was 2.23 minutes, whereas in female was 3.48 minutes, showing no statistically significant (p = 0.284) (Table 1).

**Table 1:Distribution of study participants based on onset of Local Anaesthesia between gender**

| Gender | Mean±SD | p-Value |
|---|---|---|
| **Male** | 2.23±1.0 | 0.284 |
| **Female** | 2.48±1.0 | |

t-test

Table 2 : Distribution of study population based on VAS score between gender

| Gender | No pain | Mild pain | Moderate pain | Severe pain | p-Value |
|---|---|---|---|---|---|
| **Male** | **9(27.3)** | 9(27.3) | **13(39.4)** | 2(6.0) | 0.09 |
| **Female** | **17(37)** | 3(6.5) | **22(47.8)** | 4(8.7) | |

Chi square

Table 3: Distribution of Study Population Based on VAS Score between groups

| Gender | No pain | Mild pain | Moderate pain | Severe pain | p-Value |
|---|---|---|---|---|---|
| **Case** | **26(66.7)** | 12(30.8) | **1(2.5)** | 0 | 0.00* |
| **Control** | **0** | 0 | **34(85)** | 6(15) | |

Chi square

Table 4: Distribution of study participants based on onset of Local Anaesthesia between groups

| Group | Mean±SD | p-Value |
|---|---|---|
| **Case** | **1.39±0.3** | 0.00* |
| **Control** | **3.33±0.2** | |

t test

In addition,there was no statistically significant difference between genders regarding pain perception (p = 0.09) (Table 2)

Among the patients who were given solutions without sodium bicarbonate, 34 experienced moderate pain and 6experienced severe pain during injection, from which can be deduced that all patients had pain. There was a significant difference between the control and study group as only 13 patients given local anaesthetic with sodium bicarbonate had mild pain during injection (Table 3). All patients given injections containing sodium bicarbonate had a more rapid onset of anaesthesia than the control group. The time to achieve anaesthesia was greatly reduced when buffered injections were given (Table 4).

## DISCUSSION

Pain is defined as an unpleasant emotional experience usually initiated by a noxious stimulus and transmitted over a specialized neural network to the central nervous system where it is interpreted as such.[8] Pain impacts an individual's quality of life. Intraoral local anesthesia is perceived as the most painful and, in some instances, as the only painful part of the treatment leading to in extreme cases, avoidance of dental care.[2] There are several causes for local anesthetic injection pain such as; the speed of injection, pain due to increase in volume in the tissues that causes pressure and one being the acidity of the solution itself.[9] Pain can be avoided by injecting the solution slowly, acidity of the solution can be dealt with altering the pH. For nerves with intact sheaths, local anaesthetics are more potent in alkaline, than in neutral or acid, conditions.[10] This was demonstrated in our study by adding sodium bicarbonate to the solution.

Sodium bicarbonate is a systemic alkalinizing agent. It is a chemical compound made of sodium ($Na^+$ and bicarbonate ($H_2CO_3^-$). After administration, sodium bicarbonate dissociates to form sodium ($Na^+$) and bicarbonate ($H_2CO_3^-$ ). Bicarbonate anions can consume hydrogen ions ($H^+$) and subsequently convert to carbonic acid ($H_2CO_3$). Carbonic acid subsequently converts to water ($H_2O$) and carbondioxide ($CO_2$) for excretion from lungs.[11] The main therapeutic effect of sodium bicarbonate administration is increasing plasma bicarbonate levels, which are known to buffer excess hydrogen ion concentration, thereby raising solution pH to combat clinical manifestations of acidosis.[12] We used sodium bicarbonate to increase the pH of the local anaesthetic solution to a more physiological pH.

The pH of commercially available dental anesthetic cartridges containing 2% lidocaine with epinephrine 1:100,000 ranges from 2.8644 to 4.16,45 or on average about 3.5, which are adjusted to this pH to prolong shelf life to around 36 months, and prevents the early oxidation of adrenaline, the solution is more likely to produce a burning sensation on injection and a slower onset of anaesthesia.[2,13] In this study, the pH of the control anesthetic was 3.05.

Alkalinizing the local anaesthetic solution with sodium bicarbonate will increase its pH, which increases the speed of onset of its action, making the injection more comfortable and effective. Molecules in the local anesthetic solutions mostly exist in a water-soluble state and are acidic ($RNH^+$). Conversely, for the anaesthetic to penetrate the nerve

sheath, it must be in its unionized free base form; then, $H^+$ ion needs to dissociate from the ionized molecule.[14] As the physiological pH is about 7.4, an increase in $H^+$ in the tissues could cause pain by activating nociceptors such as the acid-sensing ion channels (ASICs).[15] Buffering the local anaesthetic solution could produce less pain because fewer acid-sensing nociceptors would be activated. In addition, it is believed that using alkalinized agents, the body takes less time to change the solution from the ionized to the unionized form, increasing nerve penetration and producing rapid onset of the anaesthetic effect.[15,16]

In our study, we added 8.4% sodium bicarbonate to local anaesthetic solution in a dilution of 1/10 (3 ml of sodium bicarbonate to 30 ml of local anaesthetic solution). This reduced the pH from 3.05 to 7.38, which caused the availability of the lipophilic uncharged lidocaine molecules (RN), also called the base, to be more available for diffusion into the membrane of the nerve as the solution was close to the physiological tissue pH of 7.4. This reduced the pain caused by the injection itself.[2,7]

The efficacy and onset time of anaesthetics could be affected in inflamed tissues, such as in cases of pulpitis and abscess.[13] The Henderson-Hasselbalch equation demonstrates that if a local anaesthetic solution is buffered to a pH closer to its pKa, more of the free base form will be available.[17] Infected tissues have a pH as low as 5.0, which favours the ionized configuration of local anaesthetics and reduces anaesthetic penetration into the nerve.[15]

The increase in the effect of the local anaesthetic block attributes to the ion-trapping, which is also sometimes referred to as "diffusion trapping," or the "cation-trap effect."[13] The ion-trapping theory postulates that $CO_2$ rapidly penetrates the nerve membrane and enters the axoplasm, where it reacts with water to create carbonic acid. This process acidifies the axoplasm, which makes hydrogen ions ($H^+$) available to convert into ionized anesthetic the de-ionized anesthetic molecules (made more abundant via alkalinization) that have crossed the membrane and entered the axoplasm.[17] The converted ionized anesthetic molecules are not lipid-soluble; hence, they cannot easily leave the axon once converted and are effectively "trapped" in the axon of the nerve. The trapped ionized form of lidocaine blocks sodium channels from within the axon, eventually resulting in analgesia.[2,15] By acidifying the axoplasm, the free $CO_2$ created in the alkalinization process may also establish a pH gradient across the nerve membrane, promoting diffusion of the more basic deionized anesthetic molecules across the membrane and into the axon. Alternatively, the acidification process sets up a concentration gradient, causing the more abundant deionized anesthetic outside the nerve sheath to diffuse into the axon.[18]

All patients given local anaesthetic solution without sodium bicarbonate had pain during injection whereas patients whom alkalinized local anesthetic solution was given had obvious benefits in reducing the pain during injection which was confirmed by our results.

The deionized, free-base, or "active" form of the local anesthetic readily penetrates the lipid-rich nerve sheath.[19] Alkalinizing the anesthetic solution before injection immediately increases the active form of the drug. Neutralizing anesthetic solutions would increase their uncharged basic form; thus, the diffusion of the anesthetic solution through interstitial tissues is increased.[2] This would result in a higher concentration of the drug in the nerve axoplasm and a more rapid block of the sensory fibers. As a more rapid block develops, the pain on skin infiltration is believed to be blocked before it has even been sensed.[20] The process of combining sodium bicarbonate with lidocaine HCl creates water, salt, and free carbon dioxide. The free $CO_2$ in lidocaine solution has an independent anesthetic effect and that $CO_2$ and local anesthetics have similar effects on peripheral nerves.[21] Sodium bicarbonate ions also non-specifically reduce the margin of safety for nerve conduction, and may have a direct action on the binding of the local anaesthetic to the sodium channel.[2]The only limitation of adding sodium bicarbonate to the local anesthetic solution is the shelf life of the preparation,its only 1 week and should be used within the week.[22] Our study also concluded that the addition of sodium bicarbonate to solutions of lignocaine reduced the duration of onset of anaesthesia.

## CONCLUSION

In conclusion, the present study showed, buffered local anesthetics is more effective than non-buffered solutions. Buffering local anesthetics has greater likelihood of achieving faster onset of anesthesia and reducing pain during intra-oral injection. It is simple, inexpensive and can easily be performed by surgeons shortly before local anesthetic injection.

## ACKNOWLEDGEMENT

We would like to thank all the participants who agreed to participate in the study.

## REFERENCES


1. Haas DA. An update on local anesthetics in dentistry. J Can Dent Assoc. 2002;68(9):546-51.
2. V.M. Kashyap et al. Effect of alkalinisation of lignocaine for intraoral nerve block on pain during injection, and speed of onset of anaesthesia.Br J Oral and Maxillofacial Surgery. 2011;(49):e72–e75.
3. Bowles WH, Frysh H, Emmons R. Clinical evaluation of buffered local anesthetic. Gen Dent. 1995;43(2):182-86.
4. Ikuta PT, Raza SM, Durrani Z, et al. pH adjustment schedule for the amide local anesthetics. Reg Anesth. 1989;14(5):229-35.
5. Burns, C.A., Ferris, G., & Feng, C. Decreasing the pain of local anesthesia: a prospective, double-blind comparison of buffered, premixed 1% lidocaine with epinephrine versus 1% lidocaine freshly mixed with epinephrine. J Am Acad Dermatol.2006;(54):128–31.
6. Davies RJ. Buffering the pain of local anaesthetics: a systematic review. Emerg Med 2003;15:81–8.
7. Simon G Frank , Donald H Lalonde. How acidic is the lidocaine we are injecting, and how much bicarbonate should we add? Can J Plast Surg. 2012;20(2).
8. Bennett CR. Monheim's local anesthesia and pain control in dental practise. 7th ed. St. Louis: CV Mosby; 1984.
9. Arndt KA, Burton C, Noe JM. Minimizing the pain of local anesthesia. Plast Reconstr Surg. 1983;72:676–9.
10. Bokesch PM, Raymond SA, Strichartz GR. Dependence of lidocaine potency on pH and $pCO_2$. Anesth Analg. 1987;66:9–17.
11. Adeva-Anday MM, Fernandez-Fernandez C, Mourino-Bayolo D, Castro-Quintela E, Dominguez-Montero A. Sodium bicarbonate therapy in patients with metabolic acidosis. Sci. world J. 2014:627-73.
12. Arieff AI. Indications for use of bicarbonate in patients with metabolic acidosis. Br J Anaesth. 1991;67(2):165-77.
13. Stanley F. Malamed, SusanTavana, and Mic Falkel. Faster Onset and More Comfortable Injection with Alkalinized 2% Lidocaine with Epinephrine 1:100,000. Compend contin educ Dent 2013;34(1):10-20.
14. Kumar M, Batra R, Chopra S, Verma G, Aggarwal A, Garg A. Role of alkalinization in enhancing efficacy of the local anesthetic – a clinical study. Indian J Dent Sci. 2015;7:24–7.
15. Cepeda MS, Tzortzopoulou A, Thackrey M, Hudcova J, Arora Gandhi P, Schumann R. Adjusting the pH of lidocaine for reducing pain on injection. The Cochrane Database of Systematic Reviews. 2010(12).
16. Aulestia-Viera et al. The effect of adjusting the pH of local anaesthetics in dentistry: a systematic review and meta-analysis. Intl Endodontic Journal.2018:51:862–76.
17. Curatolo M, Petersen-Felix S, Arendt-Nielsen L, et al. Adding sodium bicarbonate to lidocaine enhances the depth of epidural blockade. Anesth Analg. 1988;86(2):341-47.
18. Burns CA, Ferris G, Feng C, et al. Decreasing the pain of local anesthesia: A prospective double-blind comparison of buffered, premixed 1% lidocaine with epinephrine versus 1% lidocaine freshly mixed with epinephrine. J Am Acad Dermatol. 2006;54(1):128-31.
19. Narahashi T, Frazier T, Yamada M. The site of action and active form of local anesthetics. I. Theory and pH experiments with tertiary compounds. J Pharmacol Exp Ther. 1970;171(1):32-44.
20. Talu H, Elibol O, Yanyali A, et al. Effect of warming and buffering lidocaine on pain during facial anesthesia. Annals of Ophthalmology. 2001;33(1):43-47.
21. Catchlove RFH. The influence of $CO_2$ and pH on local anesthetic action. J Pharmacol Exp Ther. 1972;181(2):298-309.
22. Wong K, Strichartz GR, Raymond SA. On the mechanisms of potentiation of local anesthetics by bicarbonate buffer: drug structure-activity studies on isolated peripheral nerve. Anesth Anal. 1993;76:131–43.

# Cephalometric Comparison of Collum Angle in Horizontal and Vertical Growth Patterns

Dr Dipankar Shrestha,[1] Dr Rabindra Man Shrestha,[2] Dr Jyoti Dhakal,[3] Dr Asal Acharya,[4] Dr Shreya Bajracharya[5]

[1]PG Resident, [2]Professor, [3]Associate Professor, [4]Lecturer, [5]Intern, Dept. of Orthodontics, Kantipur Dental College, Kathmandu, Nepal

**Corresponding Author**
Dr Dipankar Shrestha
Email: drdstha95@gmail.com

**Citation**
Shrestha D, Shrestha RM, Dhakal J, Bajracharya S. Cephalometric comparison of Collum angle in horizontal and vertical growth patterns. J Kantipur Dent Coll. 2022;3(1):17-20.

## ABSTRACT

**Introduction:** Collum angle; the crown-root angulation is a common interest for orthodontists. It is formed by the intersection of long axis of the crown to the long axis of root observed in lateral cephalogram. It affects the extent to which the roots can be torqued and it can also alter the intended intrusive and extrusive forces on the tooth.

**Objective**: To compare the Collum angle of maxillary central incisor tooth between horizontal and vertical growth patterns.

**Materials and methods:** It is a cross-sectional comparative study using lateral cephalogram of sixty subjects of the age range13-30 years. The samples were divided into horizontal grower and vertical grower according to the Jarabak ratio. The Collum angle of maxillary central incisor was manually traced and measured by two observers. Student's t-test was performed to compare the angle between horizontal and vertical growth patterns and between male and female subjects ($p< 0.05$).

**Results:** The mean Collum angle of horizontal growers were 6.15±7.33 and of vertical growers were 0.23±8.94. The difference between them were statistically significant ($p=0.007$). There was no significant difference in angle among the gender groups ($p=0.22$).

**Conclusion:** Collum angle of maxillary central incisor was measured significantly greater in horizontal growth pattern as compared to vertical growth pattern.

**Keywords**: Collum angle, horizontal growth pattern, jarabak ratio, lateral cephalogram, vertical growth pattern.

## INTRODUCTION

Improvement in esthetics is an important factor for patients seeking orthodontic treatment.[1] Determining the variation of individual tooth morphology is an important aspect for the establishment of finesse in esthetics during orthodontic treatment.[2] The size and shape of the crown has a strong genetic control. However, root formation process usually follow local environmental factors and vary morphologically.[3-5]

Orthodontists usually have interest in root to crown angulation in anterior single rooted tooth, known as Collum angle. It is formed by the intersection of long axis of crown to long axis of root, traced in lateral cephalogram. The crown root angulation usually affects treatment outcome in orthodontic procedure. It influences the extent to which the roots can be torqued particularly in lingual direction in relation to the cortical plates. Also, the angulated tooth can alter the intended intrusive or extrusive forces causing the root portion to impinge on labial or lingual cortical plates.[5-6]

Formation of Collum angle was explained by Logan, Backlund and Srinivasan et al. as they concluded that lower lip force and genetic factor play role in crown-root angulation of maxillary central incisors. It resulted in the bending phenomenon of Collum angle. If lower lip rested on the middle of the crown of central incisors, they showed significantly larger Collum angle. This may be due to pressure exerted by the lower lip at the time of eruption. This indicates a high predilection of lower lip as an etiologic factor for increased Collum angle.[7-9] Studies suggest that different dentofacial disharmonies have variable lip closure patterns. Relapse tendencies are more when there is failure to guide a proper lip closure in skeletal Class II malocclusions.[9,10]

Numerous studies in the literature compares Collum angle in various skeletal patterns and also different Angle's

molar relations.[5-10] However, research about comparison of Collum angle in vertical malocclusions is scarce. This study highlights the comparison of Collum angle in horizontal and vertical growth patterns in Nepali sample.

## MATERIALS AND METHODS

The study was a cross-sectional comparative study on lateral cephalogram of patients visiting Department of Orthodontics, Kantipur Dental College & Hospital, Kathmandu. The inclusion criteria were lateral cephalograms of patient of age range 13-30 years and the exclusion criteria were severe crowding in anterior tooth, previous orthodontic treatment, inferior image quality and history of craniofacial trauma that may hamper the growth. The study period was during March to April 2022. Ethical clearance was obtained from Institutional Review Committee, Kantipur Dental College (IRC Reference Number 4/022).

The sampling technique was convenience sampling and sample size was calculated using the data from the study done by Delivanis[6] using the formula:

$$N = 2X(Z\alpha + Z\beta)^2X\ \rho^2/D^2$$

Where, Zα at 95% confidence is 1.96, Zβ is 1.28 in 90% power, ρ is the average of standard deviation and D is the difference of mean in that similar study.[6]

The value from above equation was 30. Hence, another 30 sample was added due to the design effect. Therefore, total sample size was 60. The samples were divided into 30 each for horizontal and vertical growers.

Secondary data were obtained from the departmental records. Manual tracing of the films were done and then measurements were recorded in the proforma sheet by two observers separately. The samples were divided into two groups; vertical and horizontal growth patterns according to Jarabak ratio.[11] Anatomic landmarks used to determine the ratio included Sella (S), Nasion (N), Menton (Me), Gonion (Go). The linear measurements used were S-Go

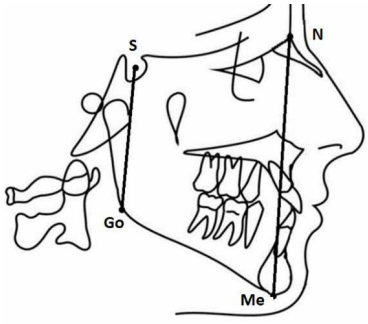



**Figure 1: Cephalometric points and linear measurements**

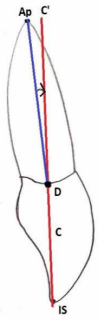



**Figure 2: Positive Collum Angle**

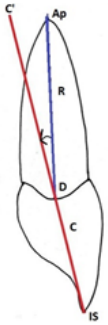



**Figure 3: Negative Collum Angle**

(posterior facial height) and N-Me (anterior facial height) (Figure 1).

Collum angle[5] was traced and measured in both growth pattern samples. The angle was formed by longitudinal axis of the crown with longitudinal axis of the root. It has either positive or negative angulations.

The anatomic landmarks used to define the angle were; Point Ap – radiographic apex of the root; Point D - located between lingual and facial projection of cemento-enamel junction; Point IS - Incision Superious - incisor tip of maxillary central incisor; R - longitudinal axis of root; C - longitudinal axis of crown; C' - longitudinal axis of crown extended towards root; Collum Angle was formed by points Ap-D-C'(Figure 2 and 3)

SPSS V21 was used to compare the means of Collum angle between the horizontal and vertical growers and between genders. Student's t-test was used for the comparison of means. The level of significance was set at $p<0.05$.

## RESULTS

The sample size of the study was 60 including 30 samples of horizontal and 30 sample of vertical growth patterns. The mean angulations and comparison between the growth patterns and between the genders are shown in Table 1. The difference between Collum angle of horizontal

**Table 1: Mean Collum angle of different variables and t – test of significance**

| Variable | n | Mean ± SD | p–Value |
|---|---|---|---|
| Horizontal growth pattern | 30 | 6.15±7.33 | 0.007* |
| Vertical growth pattern | 30 | 0.23±8.94 | |
| Female | 30 | 1.83±8.56 | 0.226 |
| Male | 30 | 4.55±8.63 | |

*Significant at p< 0.05

and vertical growth pattern was statistically significant (p=0.007). Difference between male and female was not significant (p=0.226).

## DISCUSSION

This study showed significant difference in Collum angle of maxillary central incisor between vertical and horizontal growth patterns with greater Collum angle in horizontal growth pattern sample.

The relationship between Collum angle and sagittal relationship was shown by various studies. Shailaja et al. and Delivanis observed that the incisal angulation of crowns were found in Class II division 2 patients with positive Collum angle.[6,12] As the patients with Class II division 2 malocclusions are considered horizontal growers, their findings are similar to the results of this study. On the other hand, Harris et al. found no difference in Collum angle between Class I and Class II malocclusions. Larger Collum angles are found in Class III patients.[5] Their eruptive pathway is deflected by the forwardly placed mandibular incisors into more upright position.[5,6] Arvind et al. observed that the Collum angle was decreased in Class II division 1 patients. This variation in Collum angle suggests the use different torque prescriptions and necessitates the use of alternative mechanics for tooth movement in maxillary anteriors.[13] Pai et al. found that the increased Collum angle increase the stress and strain in lingual and labial orthodontics with more pronounced effect in lingual mechanics.[14]

When compared in vertical relationship, Goma et al. found larger Collum angle in horizontal growth pattern which is similar to the findings of the present study.[15] In contrast, Behroz et al. showed difference in Collum angle in different growth patterns with increased angle in high angle cases.[16] Wang et al. measured Collum angle of maxillary central incisor in different growth patterns and differences were not significant although the mean Collum angle were higher in horizontal growth pattern.[17]

The comparison of Collum angle in horizontal and vertical growers has been done in various studies. A graph was plotted to compare the mean Collum angle in various studies which took in different places (Figure 4). It was observed that the graphs were quite variable. The horizontal grower has greater Collum angle in Nepali and Egyptian population.[15] However, opposite finding was observed in Pakistani sample as there was increased Collum angle in vertical growth pattern.[16] The Chinese population did not show much difference in the angle between growth patterns.[17]

The variation in mean Collum angle with growth pattern in various studies suggest that there is a tendency towards increased Collum angle in horizontal growth pattern with few exceptions.

This study relied on manual tracings of cephalogram to obtain Collum angle. Further exploration can be done using digital platforms for measurements for more accuracy. Furthermore, CBCT studies is also a probable arena to explore more into this topic.

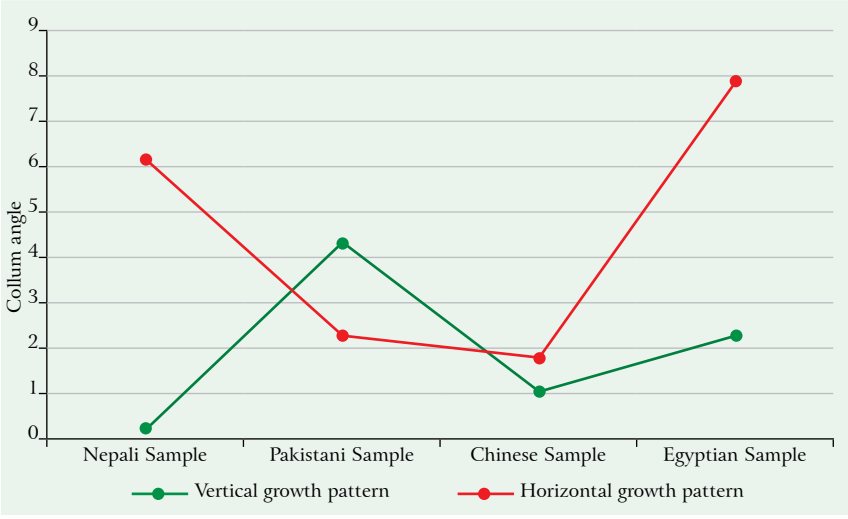



**Figure 4: Mean Collum angle in different country sample**

## CONCLUSION

Following conclusions can be drawn from the study:

- The relation of Collum angle with different growth pattern is shown to significantly vary between horizontal and vertical growth patterns.
- Larger Collum angle is found in horizontal growth pattern.


## ACKNOWLEDGEMENT

The authors would like to thank Dr Sujita Shrestha, faculty, Department of Community Dentistry for support in statistical analysis. Also, humble gratitude to Dr Ujjwal Pyakurel and Dr Alka Gupta, faculties of Department of Orthodontics, for their guidance in manuscript writing.

**CONFLICT OF INTEREST:** None.


## REFERENCES


1. Kilpeläinen PV, Phillips C, Tulloch JF. Anterior tooth position and motivation for early treatment. Angle Orthod.1993;63(3):171-4.
2. Bryant RM, Sadowsky PL, Dent M, Hazelrig JB. Variability in three morphologic features of the permanent maxillary central incisor. Am J Orthod.1984;86(1):25-32.
3. Townsend GC, Brown T. Inheritance of tooth size in Australian Aborigines. Am J Phys Anthropol.1978;48(3):305-14.
4. Kolakowski D, Bailit HL. Segregation analyses of tooth size in a Melanesian population. Ann Hum Biol.1981;8(3):255-62.
5. Harris EF, Hassankiadeh S, Harris JT. Maxillary incisor crown-root relationships in different angle malocclusions. Am J Orthod.1993;103(1):48-53.
6. Delivanis HP, Kuftinec MM. Variation in morphology of the maxillary central incisors found in Class I, Division 2 malocclusions. Am J Orthod.1980;78(4):438-43.
7. Backlund ER. Tooth from and overbite. Trans Eur Orthod Soc.1960;36(1):97-103.
8. Logan WR. Deckbiss- A clinical evaluation. Trans Eur Orthod Soc.1959;35(1):313-7.
9. Srinivasan B, Kailasam V, Chitharanjan A, Ramalingam A. Relationship between crown-root angulation (Collum angle) of maxillary central incisors in Class II, division 2 malocclusion and lower lip line. Orthodontics (Chic.). 2013;14(1):66-74.
10. Koletsi D, Makou M, Pandis N. Effect of orthodontic management and orofacial muscle training protocols on the correction of myofunctional and myoskeletal problems in developing dentition. A systematic review and meta-analysis. Orthod Craniofac Res. 2018;21(4):202-15.
11. Jarabak JR, Fizzell JA. Technique and treatment with light-wire edgewise appliances, ed. 2, St. Louis, The CV Mosby Company; 1972.
12. Shailaja AM, Gowda NC, Gowda S. The Collum angle of Maxillary Central Incisors in different skeletal malocclusions – A Cephalometric study. Int J Appl Dent Sci. 2016;2(3):33-6.
13. Arvind TR P, Felicita AS. Correlation between collum angle and lower lip position in different Class II malocclusions - A retrospective cephalometric study. Orthod Waves. 2021;80(2):81-6.
14. Pai SS, Panda S, Pai V, Anandu M, Vishwanath E, Suhas AS. Effects of labial and lingual retraction and intrusion force on maxillary central incisor with varying Collum angles: A three-dimensional finite elemental analysis. J Ind Orthod Soc. 2017;51(1):28-37.
15. Gomaa N, Elmarhoumy S, Fakhry N. Maxillary Central Incisors' Collum angle in different skeletal vertical malocclusions - A Cephalometric study. Egypt Dent J. 2019;65(1):1-7.
16. Behroz E, Ahmed HZ, Rafi S.M.T, Qadeer TA, Shah M, Fatima S. Comparison of Collum angle of maxillary central incisor in high angle and low angle patients. J Pak Dent Assoc. 2021;30(2):113-7.
17. Wang X, Ma L, Wang J, Xue H. The crown-root morphology of central incisors in different skeletal malocclusions assessed with cone-beam computed tomography. Prog Orthod. 2019;20(1):1-11.

# Relationship of Occlusal Planes and Growth Patterns in Skeletal Class I Malocclusion

Dr Prafen Pokhrel,[1] Dr Rabindra Man Shrestha,[2] Dr Jyoti Dhakal,[3] Dr Ujjwal Pyakurel,[4] Dr Amita Lama[5]

[1,5]PG Resident, [2]Professor, [3]Associate Professor, [4]Assistant Professor, Dept. of Orthodontics, Kantipur Dental College-Kathmandu University.

**Corresponding Author**
Dr Prafen Pokhrel
Email: prafenpokhrel123@gmail.com

**Citation**
Pokhrel P, Shrestha RM, Dhakal J, Pyakurel U, Lama A. Relationship of Occlusal Planes andGrowth Patterns in Skeletal Class I Malocclusion. J Kantipur Dent Coll. 2022;3(1):21-5.

## ABSTRACT

**Introduction:** The occlusal plane (OP) plays a crucial role in orthodontic diagnosis and treatment planning. The position of the mandible, smile esthetics, masticatory function and stability of the treatment are affected by occlusion. The morphology and inclination of the OP varies among individuals. It varies among sagittal and vertical patterns. There are scarce literatures regarding the relationship of occlusal planes and growth patterns in Class I malocclusion in Nepali sample.

**Objective:** To evaluate the relationship of anterior and posterior occlusal planes and growth patterns in skeletal Class I malocclusion.

**Materials and Method:** This is an observational cross-sectional study with 60 subjects of age range 12-49 years with skeletal Class I relation. The samples were selected from the lateral cephalograms of patients visiting the Department of Orthodontics, Kantipur Dental College. The ANB angle was measured to assess the sagittal jaw relationship and the Jarabak ratio to determine the growth pattern. Anterior occlusal plane (AOP) and posterior occlusal plane (POP) were drawn and measured with different horizontal planes. The measurements were compared among all the groups to evaluate the relationship between AOP and POP with different growth patterns. Descriptive statistics were calculated for each parameter. One way ANOVA was performed to determine association followed by Bonferroni test. Pearson's coefficient test was done to evaluate the correlation between the parameters.

**Results:** There was significant association of anterior and posterior occlusal planes with Sella-Nasion, Frankfort Horizontal, and Mandibular planes in various growth patterns in skeletal Class I malocclusion. The means of AOP, POP and OP difference in Class I malocclusion were 16.45°, 17.25° and -1.02° respectively.

**Conclusion:** Occlusal plane forms and inclinations vary according to the growth patterns. There is significant association between skeletal parameters with anterior occlusal plane and posterior occlusal plane, demonstrating the relationship between skeletal patterns and the vertical deviations of occlusal planes.

**Keywords:** Anterior occlusal plane; growth pattern; Jarabak ratio; lateral cephalogram; posterior occlusal plane; sagittal relationship.

## INTRODUCTION

Occlusal plane plays a crucial role in orthodontics.[1-4] Jack Dale has addressed the occlusal plane as the "workbench of orthodontics".[2] The form and inclination of OP varies individually and are related to the esthetics, function and stability of the stomatognathic system.

OP is represented as a two-dimensional segmentation of a three dimensional phenomenon in lateral cephalogram. Downs in 1948 defined occlusal plane as a line bisecting the occlusion of first molars and central incisors.[5] For the precise explanation of occlusion plane, Fushima et al. divided the maxillary occlusal plane into AOP and POP. AOP is a line drawn from incisal edge of the upper central incisor to the cusp tip of upper second premolar. POP is a line drawn from cusp tip of the upper second premolar to the midpoint of upper second molar at the occlusal surface.[1]

Previous studies related AOP and POP to horizontal planes demonstrated mandibular retrognathism and prognathism in association to AOP and POP,[1] but did not show the relationship of occlusal planes and growth patterns in skeletal Class I malocclusion. Thus, this study aims to evaluate the relationship of AOP and POP and growth patterns along with the corelation between these parameters and growth pattern in skeletal Class I malocclusion using lateral cephalogram.

## MATERIALS AND METHODS

This is an observational cross-sectional study using secondary data of the Department of Orthodontics,

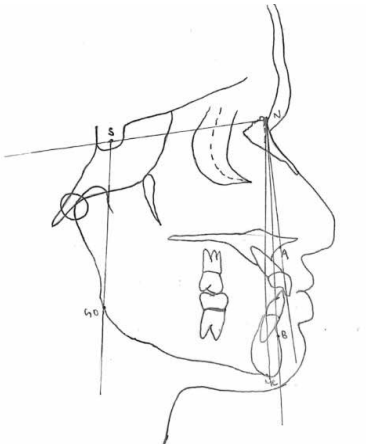


Figure 1: Cephalometric Landmarks for determining ANB angle and Jarabak Ratio

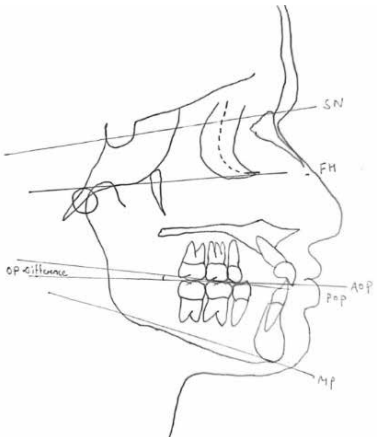


Figure 2: Horizontal planes (Sella-Nasion,Frankfort Horizontal,Mandibular Plane,Anterior and Posterior occlusal plane)

Kantipur Dental College and Hospital, Kathmandu. The study was conducted in July 2022 after obtaining the ethical clearance (IRC Ref no. 15/022). The sampling technique was non-probability convenience sampling. A total of 60 subjects were selected meeting the inclusion criteria set for the study.

Based on the study done by Amatya et al.,[10] sample size was calculated as;

$$N = 2 \times (Z\alpha + Z\beta)^2 \times SD^2/Mean^2$$

where,

N= No. of sample calculated

Zα = 1.96

Zβ= 1.65 in 95% power

P= Average of standard deviation from a similar study

D=Difference of mean in the similar study

Sample size (N) = $2 \times (1.96 + 1.65)^2 \times (4.81)^2/(5.77)^2 = 18.10 \sim 18$

The sample size was determined as 60 (20 Samples each for normal, horizontal and vertical growth pattern) summing the 10% permissible error.

Data information sheet was used to collect the information from the samples. Lateral cephalograms were traced on matte acetate tracing paper on a view box using transilluminated light. The landmarks and measurements were taken manually. Cephalometric scale and divider were used for linear and angular measurements. Steiner's ANB angle[11] was utilized to classify the skeletal malocclusion. Radiographs were again divided into normal, vertical and horizontal growth patterns according to Jarabak ratio (Figure 1).[12]

Data were collected and analyzed using SPSS V21. Descriptive statistics including mean, standard deviation were calculated for each parameter. One way ANOVA was done to determine the association among AOP and POP and different horizontal planes. Pearson's correlation coefficient test was performed to evaluate the correlation among the parameters. p Value <0.05 was considered statistically significant.

## RESULTS

The sample comprised of lateral cephalogram of 60 subjects (25 male and 35 female) aged 12-49 years. The descriptive statistics of angular parameters in skeletal Class I malocclusion is presented in Table 1.

The mean angulations of FH-POP, SN-AOP, SN-POP, MP-AOP, and MP-POP except FH-AOP were increased in vertical grower compared to normal and horizontal grower as shown in Figure 3.

Table 1. Descriptive statistics of angular parameters in skeletal Class I malocclusion

| Parameters | FH-AOP | FH-POP | OP difference (FHAOP - FHPOP) | SN-AOP | SN-POP | MP-AOP | MP-POP |
|---|---|---|---|---|---|---|---|
| **Mean** | 16.90 | 20.52 | -1.02 | 22.05 | 27.48 | 20.90 | 15.57 |
| **Standard deviation** | 6.016 | 5.689 | 7.439 | 3.814 | 5.600 | 4.753 | 3.310 |

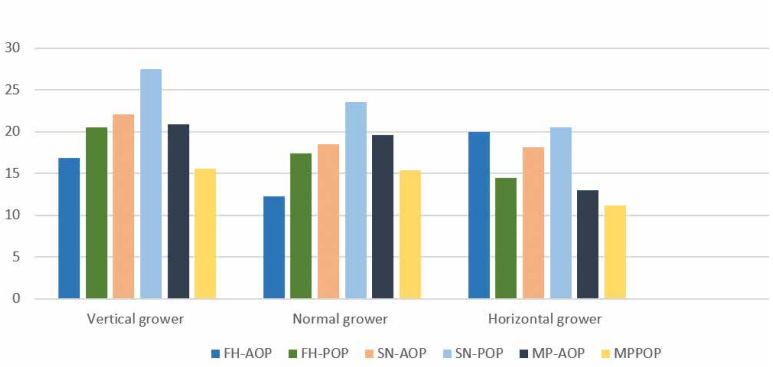



**Figure 3: Mean of angular measurements in various growth patterns**

Table 2 shows the association between anterior and posterior occlusal planes with different horizontal planes in various growth patterns in skeletal Class I malocclusion.

The result obtained from One-way ANOVA test was statistically significant which was followed by Post hoc Bonferroni test. The result from the test is presented in Table 3.

**Table 2: One way ANOVA for determining association among different angular parameters**

| Parameter | f value | p value |
|---|---|---|
| **SN-AOP** | 3.896 | 0.026* |
| **SN-POP** | 10.1014 | 0.000* |
| **FH-AOP** | 7.933 | 0.001* |
| **FH-POP** | 7.305 | 0.001* |
| **MP-AOP** | 11.695 | 0.000* |
| **MP-POP** | 5.784 | 0.000* |

* Significant at p<0.05

**Table 3: Bonferroni test for multiple comparisons in various growth patterns**

| Parameter | Measurement | p value |
|---|---|---|
| **FH-AOP** | Vertical vs Normal grower | 0.056 |
| | Vertical vs Horizontal grower | 0.340 |
| | Normal vs Horizontal grower | 0.001* |
| **FH-POP** | Vertical vs Normal grower | 0.160 |
| | Vertical vs Horizontal grower | 0.001* |
| | Normal vs Horizontal grower | 0.244 |
| **SN-AOP** | Vertical vs Normal grower | 0.080 |
| | Vertical vs Horizontal grower | 0.044* |
| | Normal vs Horizontal grower | 1.000 |
| **SN-POP** | Vertical vs Normal grower | 0.075 |
| | Vertical vs Horizontal grower | 0.000* |
| | Normal vs Horizontal grower | 0.124 |
| **MP-AOP** | Vertical vs Normal grower | 1.000 |
| | Vertical vs Horizontal grower | 0.001* |
| | Normal vs Horizontal grower | 0.001* |
| **MP-POP** | Vertical vs Normal grower | 1.000 |
| | Vertical vs Horizontal grower | 0.011* |
| | Normal vs Horizontal grower | 0.019 |

* Significant at p<0.05

Table 4: Correlation of various angular measurements with Jarabak Ratio

| Jarabak Ratio | FH-AOP | FH-POP | SN-AOP | SN-POP | MP-AOP | MP-POP |
|---|---|---|---|---|---|---|
| **Pearson's coefficient** | **-0.080** | -0.378** | -0.348** | -0.412** | -0.486** | -0.424** |
| **p Value** | **0.544** | 0.003 | 0.006 | 0.001 | 0.000 | 0.001 |

* Significant at $p<0.05$

When correlating Jarabak ratio with FH-POP, SN-AOP, SN-POP, MP-AOP and MP-POP; the parameters had negative correlation except FH-AOP (Table 4).

## DISCUSSION

Occlusal plane affects craniofacial form, growth, masticatory function, malocclusion, mandibular morphology and position, esthetics, and TMJ. The relationship of the occlusal plane to the sagittal pattern as assessed by various studies noted the varying degree of the occlusal plane inclination.[1,4,5]

From the present study, mean angulation value of AOP, POP and OP difference in Class I malocclusion were 16.45°, 17.25° and -1.02° respectively. Fushima et al. conducted a similar type of study where they found mean of AOP and POP to be 10° and 14.9° respectively. This observed difference could be the result of variation in genetic and environmental factors. Similarly a study published in 2011 by Acharya,[15] found the difference in mean angulation of FH-CP (Camper's line) between Nepali and Indian population. The report suggested ethnic difference especially in upper face result for the increased values in Nepali sample as compared to Indian sample. The present study demonstrated mean angulation of different parameters were greater among vertical growers compared to normal and horizontal growers. The result suggested of implementing different treatment protocols for stable treatment according to the growth patterns.

The present result demonstrated a significant association between AOP and POP with Sella Nasion, Frankfort Horizontal and Mandibular Plane in different growth patterns in skeletal Class I malocclusion. This was similar to the results by Hassouna et al.[9] In the present study, negative correlation was found between Jarabak ratio and angular parameters in various growers.

The study was conducted among the 60 subjects, which does not represent a whole range of population. The present study is conducted using lateral cephalogram, which is two dimensional image. Thus further research using three dimensional diagnostic aid to demonstrate relationship of occlusal planes and growth pattern in various skeletal malocclusions among large population would provide more accurate and precise information.

## CONCLUSION

There is significant association between horizontal planes with anterior and posterior occlusal planes, demonstrating the relationship between skeletal patterns and the vertical deviations of occlusal planes. Similarly, Jarabak ratio and FH-POP, SN-AOP, SN-POP, MP-AOP and MP-POP have negative correlation, i.e. increase in Jarabak ratio causes to decrease in the these parameters and vice versa. Thus, the anterior occlusal plane and posterior occlusal plane inclination should be considered in patients for the orthodontic diagnosis andtreatment planning.

## ACKNOWLEDGEMENT

Special thanks to Dr Sujita Shrestha, faculty, Department of Community & Public Health Dentistry for her support and kind cooperation in the statistical analysis of the data. Also, humble gratitude to Dr Alka Gupta and Dr Asal Acharya, faculties of Department of Orthodontics, for their guidance.

## CONFLICT OF INTEREST

None.

## REFERENCES


1. Fushima K, Kitamura Y, Mita H, Sato S, Suzuki Y, Kim YH. Significance of the cant of the posterior occlusal plane in Class II division I malocclusions. Eur J Orthod.1996;18(1):27-40.
2. Lamarque S. The importance of occlusal plane control during orthodontic mechanotherapy. Am J Orthod Dentofacial Orthop. 1995;107(5):548–58.
3. Braun S, Legan HL. Changes in occlusion related to the cant of the occlusal plane. Am J Orthod Dentofacial Orthop. 1997;111(2):184-8.
4. Li JL, Kau CH, Wang M. Changes of occlusal plane inclination after orthodontic treatment in different dentoskeletal frames. Prog Orthod. 2014;15(1):1-10.
5. Downs WB. Variations in facial relationships: their significance in treatment and prognosis. Am J Orthod. 1948;34(10):812-40.
6. Čelar A, Tafaj E, Graf A, Lettner S. Association of anterior and posterior occlusal planes with different angle and skeletal classes in permanent dentitions. J Orofac Orthop. 2018;79(4):267-76.
7. Tanaka EM, Sato S. Longitudinal alteration of the occlusal plane and development of different dentoskeletal frames during growth. Am J Orthod Dentofacial Orthop. 2008;134(5):602-3.
8. Ramos LP, Castro TA. The role of the occlusal plane in joint health in orthodontic diagnosis (Part I) Rev Mex de Orthod. 2021;8(1):60-8.
9. Hassouna Y, El Mehy G, Yousif A. Relationship of anterior and posterior occlusal planes with different sagittal and vertical patterns in adults. Alex Dent J. 2021;46(2):205-9.
10. Amatya S, Shrestha RM, Napit S. Growth pattern in skeletal Class I malocclusion: A Cephalometric Study. Orthod J Nepal. 2021;11(1):49-54.
11. Steiner C. Cephalometrics in clinical practice. Angle Orthod. 1959;29(1):8-29.
12. Jarabak JR, Fizzell JA. Technique and treatment with light-wire edgewise appliances. CV Mosby Company; 1972.
13. Thayer TA. Effects of functional versus bisected occlusal planes on the Wits appraisal. Am J Orthod Dentofacial Orthop. 1990; 97(5):422–6.
14. McNamara Jr JA. A method of cephalometric evaluation. Am J Orthod. 1984;86(6):449-69.
15. Acharya B. Comparison of maxillary occlusal plane with various craniofacial reference lines in Nepalese and Indian young adults. Orthod J Nepal. 2011;1(1):16–9.

# Knowledge, Attitude and Practice in Dental Hygiene Aids among Undergraduate Students of Different Fraternities

Dr Sarahana Shrestha,[1] Dr Sadikchya Pokhrel,[2] Dr Reshma Karki[3]

[1-3]Intern, Department of Community and Public Health Dentistry, Kantipur Dental College, Kathmandu, Nepal

**Corresponding Author**
Dr Sarahana Shrestha
Email: sthasarahana@gmail.com

**Citation**
Shrestha S, Pokhrel S, Karki R. Knowledge, Attitude and Practice in dental hygiene aids among Undergraduate students of different fraternities. J Kantipur Dent Coll. 2022;3(1):26-33.

## ABSTRACT

**Introduction:** Dental hygiene aids comprise of various ammunitions that are used for proper oral health care. Toothbrush, mouthwash, dental floss and interdental cleaning aids are a few of the most commonly used aids to facilitate day to day self-oral care practice. The objective of the study was to assess the knowledge, attitude, and practice of dental hygiene aids among undergraduate students of different fraternities.

**Materials and methods:** A cross sectional study was conducted among 420 undergraduate students from Pharmacy, Management, Information Technology, and Engineering faculties. Convenience sampling method was used. Study was then carried out online and offline using self-administered closed-ended pre-designed questionnaire. Online data was collected using the google sheet forms, whereas printed questionnaires were distributed and collected by researchers themselves. The obtained data was analyzed using Statistical Package for the Social Sciences version 20 software. Chi square test was used to compare significant differences between the variables and $p \leq 0.05$ was considered statistically significant.

**Results:** A total number of 420 students participated in this study, among which 52.4% were male and 47.6% were females. Majority of the undergraduate students had good knowledge regarding most oral hygiene aids excluding interdental aids. Toothpaste and toothbrush were the most commonly used aids. Male students had better knowledge than females, yet no significant differences were found in their attitude and practice ($p < 0.05$).Students from pharmacy and management faculties had better knowledge and positive attitude towards the dental hygiene aids. Engineering students had the least knowledge, attitude and personal practice.

**Conclusion:** The study had showed that majority of the study participants (96.4%) had good knowledge regarding tooth brushing and positive attitude towards brushing aids as compared to other hygiene aids. Despite satisfactory knowledge and attitude, very few participants were using dental hygiene aids in their daily lives to maintain oral hygiene.

**Keywords:** attitude; dental hygiene aids; knowledge; practice; undergraduate- students

## INTRODUCTION

Oral health is one of the major components of general health and well-being.[1] Negligence of one's oral health leads to consequences ranging from reduction in quality of life to mortality. Good oral health can be obtained by merely practicing good oral hygiene and regular visits to the dentist. Practicing good oral hygiene requires knowledge and awareness regarding various oral hygiene aids and also the correct methods by which those aids can be utilized for the utmost benefit to one's oral health.

Adolescence has been identified as a time when personal oral health behaviors may be internalized and become habits, as direct involvement of parents children's care is reduced.[2] Thus, having adequate knowledge of oral hygiene aids can motivate them to adopt healthy oral hygiene habits which can, in turn, be beneficial to their oral health.

Undergraduate students have the required level of understanding for practicing oral health care habits, and have accessibility to oral health care centers. Undergraduate students can also dissipate their knowledge amongst their family members and peers, which can consequently help to raise awareness about dental hygiene aids at a community level.

The present study aims to assess and compare knowledge, attitude and practice of oral hygiene aids among undergraduate students of various faculties excluding dental fraternities. As only few studies have been done in past to assess the knowledge, attitude and practice about

dental hygiene aids among undergraduate students in Nepal, this study will give a new horizon in the existing findings.

## MATERIALS AND METHODS

A cross sectional study was conducted for eight months from October, 2021 to June, 2022 among 420 undergraduate students belonging to pharmacy, management, IT and engineering faculties after getting permission from the Institutional Review Board of Kantipur Dental college. Convenience sampling technique was chosen. Twenty four self-administered, pre-designed, close ended questionnaires were used to assess the knowledge, attitude and practice of dental hygiene aids. The questionnaires were delivered to the study population via online and physical modalities. Online data collection was done using Google form that was circulated through various social media platforms. Physical data collection was done by visiting different institutions. Permissions were obtained from the respective college principals to conduct the survey. All the participants were informed about the study objectives and purpose. Only those students who volunteered to participate were included.

The questionnaires were divided into four parts. The first part covered demographic data of the participants including their age, gender and their respective faculties. The second part included 10 questions that were designed to assess the knowledge of the participants regarding the dental hygiene aids. Questions about basic oral diseases, oral health hygiene maintenance with toothbrush, floss, interdental aids, tongue cleaner, mouth wash were included.

The third part included 5 questions designed to obtain an idea about attitude of the study population towards the dental hygiene aids. The fourth part included 6 questions concerning on practice of oral hygiene. Questions were focused on daily oral hygiene habits performed by the study population irrespective of their knowledge regarding dental hygiene aids. Questions were asked in multiple choice formats where the participants chose a single option best suited for them.

The obtained data were analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics such as frequency table and percentage were used. Data were presented in tabular forms. Chi square test was used to compare significant differences between the variables and $p<0.05$ was considered statistically significant.

## RESULTS

Out of 420 students who participated, 94.3% (396) knew that brushing teeth regularly, helped prevent common dental diseases such as dental decay and gum problems. However, only 52.9% (222) of the study population knew that soft bristled toothbrushes should be opted for brushing. Two hundred and twenty-seven students knew that presence of fluoride in the toothpaste helped in prevention of dental caries. 34.3% students believed brushing once a day was enough for maintaining good oral hygiene. But, 79.3% (333) students thought that the normal interval for changing tooth brush was 3 months. Only about half of the study population was acquainted with the purpose of using dental floss to clean the interdental area with tight spaces. Students weren't well aware about interdental brushes and their uses. Only 171(40.7%) knew that interdental brushes were helpful in cleaning larger embrasures. Majority of the students (89%) had the idea that cleaning of tongue prevented bad breath and also believed use of mouth wash was necessary for proper oral health. Table 1 shows elaborative results on the knowledge of dental hygiene aids among the undergraduate students.

**Table 1: Knowledge of Dental Hygiene Aids amongst Undergraduates**

| Knowledge | | N(%) |
|---|---|---|
| Purpose of tooth brushing is to prevent tooth decay and gum diseases | No | 10 (2.4%) |
| | Don't know | 14 (3.3%) |
| | Yes | 396 (94.3%) |
| Toothbrush better to use | Don't know | 22 (5.2%) |
| | Hard bristle toothbrush | 30 (12.4%) |
| | Medium bristle toothbrush | 146 (47.1%) |
| | Soft bristle toothbrush | 222 (52.9%) |
| Presence of fluoride in toothpaste helps to prevent tooth decay | No | 59 (14.0%) |
| | Don't know | 134 (31.9%) |
| | Yes | 227 (54.0%) |

| Knowledge | | N(%) |
|---|---|---|
| Normal interval for changing toothbrush | Until the toothbrush is damaged | 44 (10.5%) |
| | Once every 6 month | 43 (10.2%) |
| | Once every 3 month | 333 (79.3%) |
| Ideal frequency to brush your teeth | Once a day | 144 (34.3%) |
| | More than once a day | 276 (65.7%) |
| Proper use of dental floss helps to clean the space between two tightly placed teeth | No | 53 (12.6%) |
| | Don't know | 130 (31.0%) |
| | Yes | 237 (56.4%) |
| Proper use of interdental toothbrush helps to clean the large space between two teeth | No | 77 (18.3%) |
| | Don't know | 172 (41.0%) |
| | Yes | 171 (40.7%) |
| Cleaning of tongue helps to remove tongue coating and obtain fresh breath | No | 14 (3.3%) |
| | Don't know | 32 (7.6%) |
| | Yes | 374 (89.0%) |
| Proper tooth brushing technique helps to prevent gum diseases | No | 25 (6.0%) |
| | Don't know | 32 (7.6%) |
| | Yes | 363 (86.4%) |
| Mouthwash is necessary to maintain oral health | No | 24 (5.7%) |
| | Don't know | 39 (9.3%) |
| | Yes | 357 (85.0%) |

**Table 2: Attitude towards Dental Hygiene Aids amongst Undergraduates**

| Attitude | | N(%) |
|---|---|---|
| Tooth brushing is necessary to maintain proper oral hygiene | No | 5 (1.2%) |
| | Don't know | 10 (2.4%) |
| | Yes | 405 (96.4%) |
| Tongue cleaning helps to prevent bad breathe | No | 32 (7.6%) |
| | Don't know | 22 (5.2%) |
| | Yes | 366 (87.1%) |
| Interdental brushing is efficient | No | 39 (9.3%) |
| | Don't know | 229 (54.5%) |
| | Yes | 152 (36.2%) |
| Mouth feels fresh after using mouthwash | No | 19 (4.5%) |
| | Don't know | 22 (5.2%) |
| | Yes | 379 (90.2%) |
| It is hygienic to keep toothbrush in the bathroom attached with toilet | No | 240 (57.1%) |
| | Don't know | 103 (24.5%) |
| | Yes | 77 (18.3%) |

Most of the students had positive attitude regarding the dental hygiene aids. 96.4% of participants believed tooth brushing was absolutely essential to maintain proper oral hygiene. Regarding other dental hygiene aids, 87.1% students were in favor of cleaning tongue to prevent bad breath and 90.2% believed that their mouth felt fresh after using mouthwash. Only 9.3% participants thought interdental aids were not efficient or required for proper oral health. 57.1% believed that keeping toothbrush in the bathroom attached with a toilet was not hygienic (Table 2).

Tooth brush and toothpaste were the most popular materials used for cleaning teeth. Though, majority of the students had proper knowledge and positive attitude regarding tooth brushing only 54% (n=227) of the undergraduates brushed their teeth more than once a day. 85.0% knew that use of mouthwash was necessary

Table 3: Practice of Dental Hygiene Aids amongst Undergraduates

| Practice | | N(%) |
|---|---|---|
| Frequency of tooth brushing in a day | Occasionally | 7 (1.7%) |
| | Once a day | 186 (44.3%) |
| | More than once a day | 227 (54%) |
| Material used for cleaning of teeth | Neem twig | 2 (0.5%) |
| | Tooth powder | 7 (1.7%) |
| | Toothbrush and toothpaste | 408 (97.1%) |
| | Others | 3 (0.7%) |
| Material used for mouth rinse | Nothing | 13 (3.1%) |
| | Plain water | 307 (73.1%) |
| | Lukewarm water with salt | 38 (9.0%) |
| | Mouthwash | 62 (14.8%) |
| Frequency of changing toothbrush | Rarely (until it gets damaged) | 52 (12.4%) |
| | Once a year | 4 (1.0%) |
| | Every 6 months | 71 (16.9%) |
| | Every 3 months | 293 (69.8%) |
| Usage of any interdental aids | No | 258 (61.4%) |
| | Yes | 162 (38.5%) |
| Material used for cleaning interdental area | Nothing | 259 (61.7%) |
| | Toothpick | 75 (17.9%) |
| | Thread | 17 (4.0%) |
| | Dental floss/ Interdental brush | 69 (16.4%) |

to maintain good oral health, however only 14.8% used mouthwash to rinse their mouth. Majority of the students opted for plain water for rinsing their mouths. Very few of the students 38.5% practiced interdental cleaning, among them toothpick was widely used(Table 3)

Regarding knowledge related questions, male students knew more that the purpose of tooth brushing was to prevent dental decay and gum diseases; 51% male and 43.3% female. The difference was statistically significant with the p value of 0.010 and no significant differences were seen in practice and attitude questions (Table 4).

Table 4: Comparison of knowledge, attitude and practice of dental hygiene aids between Male and Female Undergraduate Students

| Questions | | Male N=220(%) | Female N=200(%) | P |
|---|---|---|---|---|
| **Knowledge** | | | | |
| Purpose of tooth brushing is to prevent tooth decay and gum diseases | Yes | 214 (51%) | 182 (43.3%) | 0.010* |
| | No | 4 (1%) | 6 (1.4%) | |
| | Don't know | 2 (0.5%) | 12 (2.9%) | |
| Toothbrush better to use | Don't know | 11 (2.6%) | 11 (2.6%) | 0.382 |
| | Hard bristle | 17 (4.0%) | 13 (3.1%) | |
| | Medium bristle | 84 (20%) | 62 (14.5%) | |
| | Soft bristle | 108 (25.7%) | 114 (27.1%) | |
| Presence of fluoride in toothpaste helps to prevent tooth decay | Yes | 116 (27.6%) | 111 (26.4%) | 0.825 |
| | No | 31 (7.4%) | 28 (6.7%) | |
| | Don't know | 73 (17.4%) | 61 (14.5%) | |
| Normal interval for changing toothbrush | Until the toothbrush is damaged | 23 (5.5%) | 21 (5.0%) | 0.892 |
| | Once every 6 month | 24 (5.7%) | 19 (4.5%) | |
| | Once every 3 month | 173 (41.2%) | 160 (38.1%) | |

| Questions | | Male N=220(%) | Female N=200(%) | P |
|---|---|---|---|---|
| Ideal frequency to brush your teeth | Once a day | 81 (19.3%) | 63 (15.0%) | 0.251 |
| | More than once a day | 139 (33.1%) | 137 (32.6%) | |
| Proper use of dental floss helps to clean the space between two tightly placed teeth | Yes | 125 (29.8%) | 112 (26.7%) | 0.338 |
| | No | 32 (7.6%) | 21 (5.0%) | |
| | Don't know | 63 (15.0%) | 67 (16.0%) | |
| Proper use of interdental toothbrush helps to clean the large space between two teeth | Yes | 83 (19.8%) | 88 (21.0%) | 0.328 |
| | No | 45 (10.7%) | 32 (7.6%) | |
| | Don't know | 92 (21.9%) | 80 (19.0%) | |
| Cleaning of tongue helps to remove tongue coating and obtain fresh breath | Yes | 199 (47.4%) | 175 (41.7%) | 0.606 |
| | No | 6 (1.4%) | 8 (1.9%) | |
| | Don't know | 15 (3.6%) | 17 (4.0%) | |
| Proper tooth brushing technique helps to prevent gum diseases | Yes | 192 (45.7%) | 171 (40.7%) | 0.121 |
| | No | 16 (3.8%) | 9 (2.1%) | |
| | Don't know | 12 (2.9%) | 20 (4.8%) | |
| Mouthwash is necessary to maintain oral health | Yes | 182 (43.3%) | 175 (41.7%) | 0.378 |
| | No | 15 (3.6%) | 9 (2.1%) | |
| | Don't know | 23 (5.5%) | 16 (3.8%) | |
| **Attitude** | | | | |
| Tooth brushing is necessary to maintain proper oral hygiene | Yes | 214 (51.0%) | 191 (45.5%) | 0.340 |
| | No | 1 (0.2%) | 4 (1.0%) | |
| | Don't know | 5 (1.2%) | 5 (1.2%) | |
| Tongue cleaning helps to prevent bad breathe | Yes | 192 (45.7%) | 174 (41.4%) | 0.971 |
| | No | 17 (4.0%) | 15 (3.6%) | |
| | Don't know | 11 (2.6%) | 11 (2.6%) | |
| Interdental brushing is efficient | Yes | 76 (18.1%) | 76 (18.1%) | 0.763 |
| | No | 21 (5.0%) | 18 (4.3%) | |
| | Don't know | 123 (29.3%) | 106 (25.2%) | |
| Mouth feels fresh after using mouthwash | Yes | 195 (46.4%) | 184 (43.8%) | 0.477 |
| | No | 11 (2.6%) | 8 (1.9%) | |
| | Don't know | 14 (3.3%) | 8 (1.9%) | |
| It is hygienic to store toothbrush in the bathroom attached with toilet | Yes | 42 (10.0%) | 35 (8.3%) | 0.645 |
| | No | 121 (28.8%) | 119 (28.3%) | |
| | Don't know | 57 (13.6%) | 46 (11.0%) | |
| **Practice** | | | | |
| Frequency of tooth brushing in a day | Occasionally | 3 (0.7%) | 4 (1.0%) | 0.630 |
| | Once a day | 101 (24.0%) | 85 (20.2%) | |
| | More than once a day | 116 (27.6%) | 111 (26.4%) | |
| Material used for cleaning of teeth | Neem twig | 2 (0.5%) | 0 (0.0%) | 0.127 |
| | Tooth powder | 5 (1.2%) | 2 (0.5%) | |
| | Toothbrush and toothpaste | 210 (50.0%) | 198 (47.1%) | |
| | Others | 3 (0.7%) | 0 (0.0%) | |
| Material used for mouth rinse | Nothing | 6 (1.4%) | 7 (1.7%) | 0.575 |
| | Plain water | 167 (39.8%) | 140 (33.3%) | |
| | Lukewarm water with salt | 17 (4.0%) | 21 (5.0%) | |
| | Mouthwash | 30 (7.1%) | 32 (7.6%) | |

| Questions | | Male N=220(%) | Female N=200(%) | P |
|---|---|---|---|---|
| Frequency of changing toothbrush | Rarely (until it gets damaged) | 27 (6.4%) | 25 (6.0%) | 0.909 |
| | Once a year | 2 (0.5%) | 2 (0.5%) | |
| | Every 6 months | 40 (9.5%) | 31 (7.4%) | |
| | Every 3 months | 151 (36%) | 142 (33.8%) | |
| Usage of any interdental aids | Yes | 86 (20.5%) | 76 (18.1%) | 0.625 |
| | No | 134 (31.9%) | 124 (29.5%) | |
| Material used for cleaning interdental area | Nothing | 133 (31.7%) | 126 (30.0%) | 0.864 |
| | Toothpick | 42 (10.0%) | 33 (7.9%) | |
| | Thread | 8 (1.9%) | 9 (2.1%) | |
| | Dental floss/ Interdental brush | 37 (8.8%) | 32 (7.6%) | |

p value< 0.05 considered statistically significant

While comparing the results between the four different sampled faculties (pharmacy, IT, engineering and management), few questions in knowledge section were statistically significant. Among 77 engineering students, majority (14.5%) thought medium bristled brush was appropriate whereas, majority of students from all the other faculties chose soft bristled brush. The difference was statistically significant (p = 0.00). Pharmacy students had better knowledge regarding the purpose of fluoride in toothpaste as compared to the other three faculties and difference was statistically significant (p= 0.00).

Significant differences were seen in attitude and practice related questions. Among the four faculties, engineering students were found to have least percentile with positive attitude and practice regarding dental hygiene aids (Table 5).

Table 5: Comparison among the undergraduate students regarding the knowledge, attitude and practice of dental hygiene aids

**Table 5: Comparison among the undergraduate students regarding the knowledge, attitude and practice of dental hygiene aids**

| Questions | | Pharmacy N=117(%) | IT N=110(%) | Engineering N=77(%) | Management N=116(%) | P |
|---|---|---|---|---|---|---|
| **Knowledge** | | | | | | |
| Purpose of tooth brushing is to prevent tooth decay and gum diseases | Yes | 111(26.4%) | 105(25.0%) | 75 (17.9%) | 105 (25.0%) | 0.112 |
| | No | 2 (0.5%) | 0 (0.00%) | 2 (0.5%) | 6 (1.4%) | |
| | Don't know | 4 (1.0%) | 5 (1.2%) | 0 (0.0%) | 5 (1.2%) | |
| Toothbrush better to use | Don't know | 6 (1.4%) | 13 (3.1%) | 0 (0.0%) | 3 (0.7%) | 0.000* |
| | Hard bristle | 1 (0.2%) | 12 (2.9%) | 16 (3.8%) | 1 (0.2%) | |
| | Medium bristle | 29 (6.7%) | 26 (6.2%) | 61 (14.5%) | 30 (7.1%) | |
| | Soft bristle | 81 (19.3%) | 59 (14.0%) | 0 (0.0%) | 82 (19.5%) | |
| Presence of fluoride in toothpaste helps to prevent tooth decay | Yes | 79 (18.8%) | 69 (16.4%) | 47(11.1%) | 32 (7.6%) | 0.000* |
| | No | 14 (3.3%) | 7 (1.6%) | 13 (3.0%) | 25 (6.0%) | |
| | Don't know | 24 (5.7%) | 34 (8.0%) | 17 (4.0%) | 59 (14.0%) | |
| Normal interval for changing toothbrush | Until the toothbrush is damaged | 9 (2.1%) | 19 (4.5%) | 9 (2.1%) | 7 (1.7%) | 0.059 |
| | Once every 6 month | 8 (1.9%) | 10 (2.4%) | 9 (2.1%) | 16 (3.8%) | |
| | Once every 3 month | 100 (23.8%) | 81 (19.3%) | 59 (14.0%) | 93 (22.1%) | |
| Ideal frequency to brush your teeth | Once a day | 49 (11.7%) | 31 (7.4%) | 19 (4.5%) | 45 (10.7%) | 0.029* |
| | More than once a day | 68 (16.2%) | 79 (18.8%) | 58 (13.8%) | 71 (16.9%) | |
| Proper use of dental floss helps to clean the space between two tightly placed teeth | Yes | 61 (14.5%) | 70 (16.7%) | 56 (13.3%) | 50 (11.9%) | 0.000* |
| | No | 15 (3.6%) | 7 (1.7%) | 10 (2.4%) | 21 (5.0%) | |
| | Don't know | 41 (9.8%) | 33 (7.9%) | 11 (2.6%) | 45 (10.7%) | |

| Questions | | Pharmacy N=117(%) | IT N=110(%) | Engineering N=77(%) | Management N=116(%) | P |
|---|---|---|---|---|---|---|
| Proper use of interdental toothbrush helps to clean the large space between two teeth | Yes | 48 (11.4%) | 49 (11.7%) | 30 (7.1%) | 44 (10.5%) | 0.409 |
| | No | 22 (5.2%) | 12 (2.9%) | 17 (4.0%) | 26 (6.2%) | |
| | Don't know | 47 (11.2%) | 49 (11.7%) | 30 (7.1%) | 46 (11.0%) | |
| Cleaning of tongue helps to remove tongue coating and obtain fresh breath | Yes | 104 (24.8%) | 96 (22.9%) | 68 (16.2%) | 106 (25.2%) | 0.763 |
| | No | 5 (1.2%) | 5 (1.2%) | 1 (0.2%) | 3 (0.7%) | |
| | Don't know | 8 (1.9%) | 9 (2.1%) | 8 (1.9%) | 7 (1.7%) | |
| Proper tooth brushing technique helps to prevent gum diseases | Yes | 101 (24.0%) | 100 (23.8%) | 68 (16.2%) | 94 (22.4%) | 0.390 |
| | No | 8 (1.9%) | 3 (0.7%) | 5 (1.2%) | 9 (2.1%) | |
| | Don't know | 8 (1.9%) | 7 (1.7%) | 4 (1.0%) | 13 (3.1%) | |
| Mouthwash is necessary to maintain oral health | Yes | 103 (24.5%) | 93 (22.1%) | 63 (15.0%) | 98 (23.3%) | 0.625 |
| | No | 5 (1.2%) | 4 (1.0%) | 6 (1.4%) | 9 (2.1%) | |
| | Don't know | 9 (2.1%) | 13 (3.1%) | 8 (1.9%) | 9 (2.1%) | |
| **Attitude** | | | | | | |
| Tooth brushing is necessary to maintain proper oral hygiene | Yes | 111 (26.4%) | 109 (26.0%) | 76 (18.1%) | 109 (26.0%) | 0.046* |
| | No | 4 (1.0%) | 0 (0.0%) | 0 (0.0%) | 1 (0.2%) | |
| | Don't know | 2 (0.5%) | 1 (0.2%) | 1 (0.2%) | 6 (1.4%) | |
| Tongue cleaning helps to prevent bad breathe | Yes | 93 (22.1%) | 108 (25.7%) | 73 (17.4%) | 92 (21.9%) | 0.000* |
| | No | 13 (3.1%) | 0 (0.0%) | 4 (1.0%) | 15 (3.6%) | |
| | Don't know | 11 (2.6%) | 2 (0.5%) | 0 (0.0%) | 9 (2.1%) | |
| Interdental brushing is efficient | Yes | 32 (7.6%) | 47 (11.2%) | 29 (6.9%) | 44 (10.5%) | 0.022* |
| | No | 9 (2.1%) | 10 (2.4%) | 3 (0.7%) | 17 (4.0%) | |
| | Don't know | 76 (18.1%) | 53 (12.6%) | 45 (10.7%) | 55 (13.1%) | |
| Mouth feels fresh after using mouthwash | Yes | 104 (24.8%) | 97 (23.1%) | 67 (16.0%) | 111 (26.4%) | 0.024* |
| | No | 9 (2.1%) | 3 (0.7%) | 3 (0.7%) | 4 (1.0%) | |
| | Don't know | 4 (1.0%) | 10 (2.4%) | 7 (1.7%) | 1 (0.2%) | |
| It is hygienic to store toothbrush in the bathroom attached with toilet | Yes | 18 (4.3%) | 39 (9.3%) | 8 (1.9%) | 12 (2.9%) | 0.000* |
| | No | 81 (19.3%) | 37 (8.8%) | 40 (9.5%) | 82 (19.5%) | |
| | Don't know | 18 (4.3%) | 34 (8.1%) | 29 (6.9%) | 22 (5.2%) | |
| **Practice** | | | | | | |
| Frequency of tooth brushing in a day | Occasionally | 3 (0.7%) | 1 (0.2%) | 1 (0.2%) | 2 (0.5%) | 0.039* |
| | Once a day | 67 (16.0%) | 38 (9.0%) | 30 (7.1%) | 51 (12.1%) | |
| | More than once a day | 47 (11.2%) | 71 (16.9%) | 46 (11.0%) | 63 (15.0%) | |
| Material used for cleaning of teeth | Neem twig | 0 (0.0%) | 2 (0.5%) | 0 (0.0%) | 0 (0.0%) | 0.202 |
| | Tooth powder | 3 (0.7%) | 3 (0.7%) | 0 (0.0%) | 1 (0.2%) | |
| | Toothbrush and toothpaste | 114 (27.1%) | 103 (24.5%) | 77 (18.3%) | 114 (27.1%) | |
| | Others | 0 (0.0%) | 2 (0.5%) | 0 (0.0%) | 1 (0.2%) | |
| Material used for mouth rinse | Nothing | 4 (1.0%) | 2 (0.5%) | 2 (0.5%) | 5 (1.2%) | 0.000* |
| | Plain water | 89 (21.2%) | 65 (15.5%) | 69 (16.4%) | 84 (20.0%) | |
| | Lukewarm water with salt | 8 (1.9%) | 14 (3.3%) | 1 (0.2%) | 15 (3.6%) | |
| | Mouthwash | 16 (3.8%) | 29 (6.9%) | 5 (1.2%) | 12 (2.9%) | |
| Frequency of changing toothbrush | Rarely (until it gets damaged) | 13 (3.1%) | 17 (4.0%) | 11 (2.6%) | 11 (2.6%) | 0.278 |
| | Once a year | 0 (0.0%) | 1 (0.2%) | 1 (0.2%) | 2 (0.5%) | |
| | Every 6 months | 13 (3.1%) | 21 (5.0%) | 18 (4.3%) | 19 (4.5%) | |
| | Every 3 months | 91 (21.7%) | 71 (16.9%) | 47 (11.2%) | 84 (20.0%) | |
| Usage of any interdental aids | Yes | 38 (9.0%) | 46 (11.0%) | 37 (8.8%) | 41 (9.8%) | 0.208 |
| | No | 79 (18.8%) | 64 (15.2%) | 40 (9.5%) | 75 (17.9%) | |
| Material used for cleaning interdental area | Nothing | 79 (18.8%) | 64 (15.2%) | 41 (9.8%) | 75 (17.9%) | 0.000* |
| | Toothpick | 25 (6.0%) | 11 (2.6%) | 12 (2.9%) | 27 (6.4%) | |
| | Thread | 0 (0.0%) | 8 (1.9%) | 5 (1.2%) | 4 (1.0%) | |
| | Dental floss/ Interdental brush | 13 (3.1%) | 27 (6.4%) | 19 (4.5%) | 10 (2.4%) | |

p value< 0.05 considered statistically significant

## DISCUSSION

Various studies have emphasized that undergraduate students belonging to the young and middle age group have worse oral hygiene than older adults, despite the fact that oral problems tend to increase with age.[3,4] Subjective oral health is affected more deleteriously when experience of oral disease occur earlier in adulthood, than in older ages.[4] Instilling good oral health practices at this age becomes crucial as the continuation of the same behavior pattern is inevitable during the older ages.

The present study demonstrates that even though majority of the undergraduate students had good knowledge regarding the preventive dental hygiene aids, few of the participants had inadequate practice. Similar results were reported by Kumar et al.[5] The most common and familiar oral hygiene aids amongst the undergraduate students in present study were toothpaste and toothbrush. This result was in accordance with a study conducted among college students in Bengaluru city of India.[6] The use of interdental aids however was not very common among the students as they had least knowledge about dental hygiene aids. These results were comparable with another study in South Asian undergraduate students reported by Gopikrishna et al.[6] In contrast to present study, majority of the young students in San Francisco used dental floss at least once a day.[7] The difference in practice of dental hygiene may be due to additional cost of interdental aids and mouthwash. Awareness program on various dental hygiene aids is recommended for the improvement of knowledge and practice.

Regarding knowledge related questions, more of male students knew that the purpose of tooth brushing was to prevent dental decay and gum diseases. This result was in contrast with most of the studies conducted in India and Jordan.[1, 5, 8] There was no comparable difference in attitude and practice related questions among the genders.

Among the four faculties, engineering students had the least knowledge, positive attitude as well as practice of oral hygiene aids. A study conducted among 362 engineering students of Bhubaneswar city, Odisha, India reported adequate knowledge with respect to oral health and practice of using fluoridated toothpaste and floss however, lacked good hygiene habits.[9]

## CONCLUSION

Majority of the undergraduate students had good knowledge regarding the oral hygiene aids except interdental aids. The participants had positive attitude towards the use of dental aids but lacked in maintaining good oral hygiene. The most common oral hygiene aids used were toothpaste and toothbrush. Male students had better knowledge than female. Engineering students had the least knowledge, attitude and personal practice on dental hygiene aids. Adolescents should be aware of various consequences of improper oral health hygiene and start instilling proper oral hygiene practices daily. Practice of oral health hygiene habits should be emphasized in their basic health courses so as to reinforce good oral hygiene habits throughout their life

**Conflicts of interest:** None

**Financial sponsorship:** Nil

## REFERENCES

1. Priya M, Devdas K, Amarlal D, Venkatachalapathy A. Oral health attitudes, knowledge and practice among school children in Chennai, India. J of Edu & Ethics in Dent. 2013;3(1):26-33.
2. Reddy V, Bennadi D, Gaduputi S, Kshetrimayum N, Siluvai S, Reddy CV. Oral health related knowledge, attitude, and practice among the pre-university students of Mysore city. J of Int Soc of Preventive & Community Dentistry. 2014;(3):154-158.
3. Drachev S, Brenn T, Trovik T. Oral Health-Related Quality of Life in Young Adults: A Survey of Russian Undergraduate Students. Int J of Env Res and Public Health 2018;15(4):719.
4. Slade GD, Sanders AE. The paradox of better subjective oral health in older age. J Dent Res. 2011;90(11):1279-85
5. Kumar H, Behura SS, Ramachandra S, Nishat R, Dash KC, Mohiddin G. Oral health knowledge, attitude, and practices among dental and medical students in Eastern India–A comparative study. J of Int Soc of Prev & Community Dent. 2017;7(1):58-63.
6. Gopikrishna V, Bhaskar NN, Kulkarni SB, Jacob J, Sourabha KG. Knowledge, attitude, and practices of oral hygiene among college students in Bengaluru city. J of Ind Assoc of Public Health Dent. 2016;14(1):75-79.
7. Walsh MM. Effects of school-based dental health education on knowledge, attitudes and behavior of adolescents in San Francisco. Comm Dent Oral Epidemiol 1985;13:143-7
8. Al-Omari QD, Al-HadiHamasha A. Gender specific oral health attitudes and behaviour among Dental students in Jordan. J Contemp Dent Pract. 2005;6:107–14
9. Bandyopadhyay A, Bhuyan L, Panda A, Dash K, Raghuvanshi M, BehuraSS. Assessment of Oral Hygiene Knowledge, Practices, and Concepts of Tobacco Usage among Engineering Students in Bhubaneswar, Odisha, India. The J of Cont Dent Pract. 2017;18(6):423-28

# Hemisection of Mandibular Molar: A Conservative Approach for Management of Perio-Endo Lesion

Dr Binita Shrestha,[1] Dr Sandhya Shrestha,[2] Dr Kamana Neupane[3]

[1]PG Resident, [2]Assoc. Professor, Department of Conservative Dentistry and Endodontics, [3]PG Resident, Department of Periodontology and Oral Implantology, Kantipur Dental College, Kathmandu, Nepal.

**Corresponding Author**
Dr Binita Shrestha
Email: binitashrestha545@gmail.com

**Citation**
Shrestha B, Shrestha S, Neupane K. Hemisection of Mandibular Molar: A Conservative Approach for Management of Perio-Endo Lesion. J Kantipur Dent Coll. 2022;3(1):34-7.

## ABSTRACT

Hemisection is considered as the conservative treatment option for treating molars with primary periodontal lesion with secondary endodontic involvement that involves the single root. This procedure involves the resection of periodontally involved rootalong with the associated crown to preserve the remaining part of the molar having sound periodontium. Multi-disciplinary approach should be considered for the proper treatment and prognosis of the tooth as it depends on various factors like severity of bone loss, root trunk length, degree of root separation, the curvature of the root, prosthetic rehabilitation and maintenance of oral hygiene. In this case report, root canal treatment and hemisection followed by prosthetic rehabilitation were successfully performed to treat perio-endo lesions of a mandibular molar.

**Keywords:** Furcation involvement; Hemisection; Perio-endo lesion

## INTRODUCTION

The pulp and periodontium have embryonic, and anatomic correlations. The periodontium communicates with the dental pulp through various pathways such as dentinal tubules, apical foramen, and lateral and accessory canals. These are the pathways through which pathological agents pass between pulp and periodontium, thereby creating perio-endo lesions.[1] Due to the complexities of these infections, a multidisciplinary treatment approach should be applied to treat these primary periodontal with secondary endodontic lesions that include both endodontic and periodontal therapy followed by proper prosthetic rehabilitation.[2]

This article presents a case report of the primary periodontal lesion with secondary endodontic involvement in the lower molar treated by conventional endodontic treatment and hemisection followed by prosthetic rehabilitation.

## CASE REPORT

A 41-year-old female patient reported to the Department of Conservative Dentistry and Endodontics, Kantipur Dental Collegewith a complaint of mobility of the tooth in the lower right back region of the jaw for the past one year. Mobility was progressive and associated with discomfort on mastication. There was no relevant history of any systemic disease. On intraoral examination, tooth 46 had cervical abrasion with gingival recession. The tooth was tender on percussion with grade II mobility. Probing depth was 10 mm around the distobuccal area (Figure 1) and 12 mm in the distolingual area. The tooth showed nonvital response on the electrical pulp tester as well as to cold and heat tests. An intraoral periapical radiograph (IOPA) showed severe vertical bone loss surrounding the distal root along with furcation involvement. However mesial root exhibited completely intact bone support (Figure 2). Cone Beam Computed Tomography (CBCT) of that area also showed similar findings. (Figure 3). Thus, it was identified as a primary periodontal lesion with secondary endodontic involvement of tooth 46.

The patient was explained the condition and prognosis of the tooth with feasible treatment options. The patient opted for hemisection followed by prosthetic rehabilitation over other treatment options.

Root canal treatment was performed. After access cavity preparation, working length was determined and canals were prepared with K -files. Irrigation was carried out with 2.5% NaOCl and 17% EDTA and calcium hydroxide was placed as intracanal medicament. On the subsequent visit,

canals were dried with sterile paper point and obturation was done using gutta-percha and resin-based sealer. Composite was used for post-endodontic restoration (Figure 4-6).

After completion of endodontic therapy,the patient was referred to the Department of Periodontics for hemisection. After one month, under local anesthesia, the full thickness mucoperiosteal flap was elevated by giving a crevicular incision from the second premolar to the second molar (Figure 7). A vertical cut was made faciolingually through the buccal and lingual developmental grooves toward thepulp chamber and the furcation area using a long shank tapered fissure carbide bur (Figure 8). The distal root along with its crown was extracted a traumatically and inflammatory granulation tissues were removed with the help of Gracey curettes. Thorough debridement and irrigation were done to remove bony chips. Platelet-rich fibrin (PRF) was placed for the preservation of the extraction socket. The flap was repositioned and sutured using 3 -0 black silk. The occlusal table was reduced to redirect the forces along the long axis of the mesial root and the operated area was covered with a periodontal dressing. Immediate IOPA showed the good condition of the extraction socket and the mesial root (Figure 9-13). After 1 week, the sutures were removed, and wound healing was evaluated. At 1 month of follow-up, healing was satisfactory with reduced pocket depth and mobility (Figure 14).

The patient was recalled after 1 month for prosthetic rehabilitation. But due to the pandemic of COVID – 19, the patient could not report back. The patient visited after 5 months, and healing was uneventful. The patient was advised for Fixed Partial Denture (FPD) using tooth 47 and mesial root of 46 as an abutment. Porcelain fused to metal (PFM) crown in 46 and all-metal crown in 47 was advised. Tooth preparations were done, and a provisional prosthesis was provided. After 1 week, cementation of FPD was done with the help of Glass Ionomer Cement (Figure 15-18).

**Figure 1: Periodontal pocket with distal root**

**Figure 2: Pre- operative radiograph**

**Figure 3: Pre- operative CBCT**

**Figure 4: Access Opening**

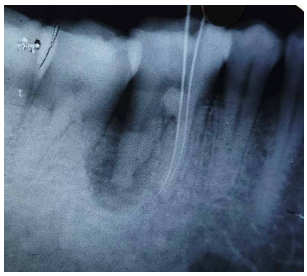


**Figure 5: Working length determination**

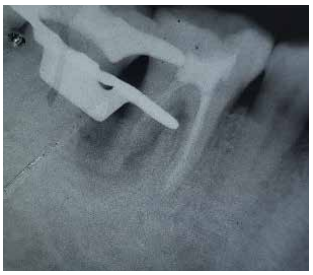


**Figure 6: Post Obturation**

**Figure 7: Reflection of mucoperiosteal flap**

**Figure 8: Sectioning of distal root**

**Figure 9: Extracted distal root**

**Figure 10: PRF on distal socket**

**Figure 11: Suture placed**

**Figure 12: Periodontal dressing placed**

Figure 13: Immediate postoperative radiograph

Figure 14: Follow- up after 1 week

Figure 15: Follow- up after 5 months

Figure 16: After tooth preparation

Figure 17: Fabricated FPD

Figure 18: FPD cemented

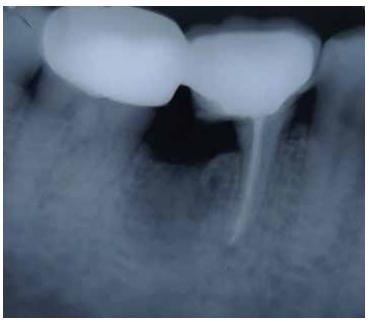


Figure 19: Post- cementation radiograph

## DISCUSSION

The periodontal-endodontic lesions is characterized by the involvement of the pulp and periodontal tissues in the same tooth. It may start as a separate entity, either through periodontium or pulp, but there is a chance to have a combined effect at the time of presentation. Progression of the periodontal disease leads to pulpal involvement mainly via apical foramen. Other pathways may include accessory, lateral, and secondary canals as well as dentinal tubules.[1] Elimination of both the disease process is required for the success of combined periodontal and endodontic lesions.

Hemisection is defined as the sectioning of a tooth consisting of two roots into the two halves followed by the removal of the diseased root and its coronal portion, which are not preservable by either endodontic treatment or periapical surgery.[3] It is a conservative and alternative treatment option instead of extraction. Indications of hemisection are; severe vertical bone loss involving only one root of multi-rooted teeth, furcation involvement, endodontic failure or vertical fracture of one root. The procedure converts furcation involved multi-rooted teeth into the non-furcated single-root tooth. It retains the tooth structure and surrounding bone, provides favorable environment for oral hygiene maintenance, reduces financial burden and psychological trauma of the patient associated with tooth loss.

The survival rate of the tooth treated with hemisection varies according to different authors. The survival rate is 93% over a 10-year follow-up according to Carnevale et. al,[4] and 80-94% as reported by Friedman.[5] Fugazzotto[6] compared the success rates of root-resected molars and molars treated with the implant which were 96.8% and 97.0% respectively and concluded that both root resection and implant placement with appropriate restoration demonstrated a high degree of success. Kinsel et al.[7] reported a 15.9% failure rate for root-resection therapy, whereas single implants showed a 3.6% failure rate.

For the long-term survival of hemisected teeth various factors like amount of bone support,angulation, and position of teeth in the arch, medical conditions, oral hygiene of patients, endodontic, periodontal, and prosthodontic factors should be considered.[8] As these hemisectioned molars fails mainly due to endodontic or restorative problems rather than periodontal disease, care must be provided for proper cleaning, shaping, and obturation of the remaining roots.

Platelet-rich fibrin was used for socket preservation to maintain the original topography of the alveolar ridge. It is harvested from venous blood, which is rich in fibrin, platelets, white blood cells, growth factors, and cytokines that helps to regulate proliferation, differentiation, and apoptosis of repair-related cells, and subsequently promotes tissue repair.[9]

The remaining tooth structure are adequately restored with extra coronal restoration to prevent chances of failure by root fracture. In this case, FDP with two abutments i.e., the mesial root of mandibular first and second molar was provided. Due to the inappropriate crown root ratio of the remaining mesial root, a single crown was not feasible. Ideally intentional root canal treatment of the abutment tooth is suggested. However,it was not performed in this case as studies suggest that clinical and radiographic success of vital teeth, when used as an abutment for crown and FPD, is relatively high ranging between 92 to 98% at different follow-up periods ranging between 5 - 20 years.[10] According to Goodacre et. al. need for endodontic treatment was only 1% among abutments of all ceramic crowns and 11% among abutments for FPDs.[11]

However, hemisection also has some disadvantages such as pain and anxiety associated with surgical procedures, root surfaces reshaped by grinding in the furcation site are susceptible to caries, improperly shaped occlusal contact areas may convert acceptable forces into destructive forces and predispose tooth to trauma from occlusion leading to root fracture and ultimate failure.[12] This procedure has limitation like closely approximated or fused roots, medically compromised patients, patients with bad compliance, and poor endodontic candidates or inoperable endodontic roots.[13]

## CONCLUSION

Hemisection is an effective and conservative treatment alternative for molars with perio- endo lesions with furcation involvement over the conventional treatment modalities. It preserves the remaining part of the tooth having sound periodontium. The prognosis depends upon condition of remaining root, prosthetic rehabilitation, and oral hygiene of the patient. Therefore, this procedure requires meticulous planning, a multi-disciplinary approach as well as regular maintenance for long-term survival.

## REFERENCES


1. Sunitha VR, Emmadi P, Namasivayam A, Thyegarajan R, Rajaraman V. The periodontal - endodontic continuum: A review. J Conserv Dent. 2008;11(2):54-62.
2. Al-Fouzan KS. A new classification of endodontic-periodontal lesions. Int J Dent. 2014;2014:919173.
3. Radke U, Kubde R, Paldiwal A. Hemisection: a window of hope for freezing tooth. Case Rep Dent. 2012;2012:390874.
4. Carnevale G, Di Febo G, Tonelli MP, Marin C, Fuzzi M. A retrospective analysis of the periodontal-prosthetic treatment of molars with interradicular lesions. Int J Perio & Resto Dent. 1991;11(3):189-205.
5. Friedman S. Prognosis and expected outcome of apical surgery. Endodontic Topics. 2006;11:219-62.
6. Fugazzotto PA. A comparison of the success of root resected molars and molar position implants in function in a private practice: results of up to 15-plus years. J Perio. 2001;72(8):1113-23.
7. Kinsel RP, Lamb RE, Ho D. The treatment dilemma of the furcated molar: root resection versus single-tooth implant restoration. A literature review. Int J Oral & Maxillofacial Implants. 1998;13(3):322-32.
8. Babaji P, Sihag T, Chaurasia VR, Senthilnathan S. Hemisection: A conservative management of periodontally involved molar tooth in a young patient. J Natural sci, biology, and medicine. 2015;6(1):253-5.
9. Zhang Y, Ruan Z, Shen M, Tan L, Huang W, Wang L, et al. Clinical effect of platelet-rich fibrin on the preservation of the alveolar ridge following tooth extraction. Experimental and therapeutic medicine. 2018;15(3):2277-86.
10. Kohli S, Bhatia S, Al-Haddad A, Pulikkotil SJ, Jamayet NBJJoP. Pulpal and periapical status of the vital teeth used as abutment for fixed prosthesis - a systematic review and meta-analysis. 2022;31(2):102-14.
11. Goodacre CJ, Bernal G, Rungcharassaeng K, Kan JYJTJopd. Clinical complications in fixed prosthodontics. 2003;90(1):31-41.
12. Hasija M, Wadhwani KK, Yadav RK, Hasija DW, Kumar V. Hemisection-hope for last survival. National J Maxillofacial Surgery. 2013;4(2):260-1.
13. Nowokowski AT, Serebnitski A, Pesun IJJOH. Hemisection as a treatment option: A case report. 2010;100(3):83.

# Prosthetic Rehabilitation of a Patient with an Ocular Defect: A Simplified Clinical Approach

Dr Rewant Rajbhandari,[1] Dr Barsha Ghimire,[2] Dr Saishab Dhital,[3] Dr Sunita Prajapati[4]

[1,4]Post Graduate, [2]Asst. Professor, [3]Lecturer; Department of Prosthodontics, Kantipur dental college and research center.

**Corresponding Author**
Dr Rewant Rajbhandari
Email: rewant777@gmail.com

**Citation**
Rajbhandari R, Ghimire B, Dhital S, Prajapati S. Prosthetic Rehabilitation of a Patient with an Ocular Defect: A Simplified Clinical Approach. J Kantipur Dent Coll. 2022;3(1):38-40.

## ABSTRACT

Maxillofacial rehabilitation is always challenging task which is a blend of art and science. Providing artificial substitute to restore the form and functions is mandatory to boost psychological as well as social status of such patients. Methods : Ocular defects constitute an important maxillofacial deficiency which requires prosthetic replacement to restore aesthetics and comfort of the patient with esthetic appearance facial . Results : The optimum cosmetic and functional results of a custom made ocular prosthesis enhance the patient rehabilitation to anormal lifestyle. Conclusions: This case report elaborates the technique of fabrication of custom-made ocular prosthesis with the use of tooth colored self-cure acrylic which develop the moral to the patient.

**Keywords:** Iris positioning, ocular prosthesis , prosthodontics.

## INTRODUCTION

The face is a picture of the mind with the eyes as its interpreter. The unfortunate loss or absence of an eye may occur due to congenital defect, irreparable trauma or tumors. The defacement due to loss of an eye can cause significant physical and emotional problems.[1] Therefore providing an artificial substitute to restore the form and functions is essential for such disability. Prosthetic rehabilitation of such patient has therefore become the treatment option to restore aesthetics and comfort and also elevate psychological status of such patients.[2]

The procedure of prosthetic eye replacement presents many challenges such as the precise alignment of the iris, correct inter pupillary distance and positioning with respect to the contralateral eye[3,4]. Many methods for the precise positioning of the iris have been described such as use of an ocular locator, fixed calipers, grids, dividers, inverted anatomic tracings, visual assessment etc.[5]

## CASE REPORT

A 28 year old male patient was referred to the Department of Prosthodontics, Kantipur Dental College and Hospital with a complaint of facial disfigurement due to loss of the left eye(Figure 1). History of trauma of the left eye followed by evisceration was noted. A custom-made acrylic resin ocular prosthesis was planned, and the treatment procedure was explained to the patients and consent was obtained.

Figure 1: Pre-operative view

**Clinical procedures**

The irreversible hydrocolloidal material as shown in figure1 (Plastalgin Chromatic, Septodent Healthcare PVT LTD, India ) was manipulated with a water powder ratio of 16 gm powder with 36 ml water to obtain a slight fluid flowable mix that would easily syringed into the defect to make a preliminary impression.

Wax spacer was adapted and an acrylic custom tray was then fabricated for better fit on the defect( Figure 3), and a final impression was made with elastomeric impression material. The acrylic custom tray was loaded with polyvinyl siloxane impression material (Bonasil) and injected into the defect.(Figure 4)

The patient was ask to make the eye moments so as to obtain a functional impression. Once set, the impression was removed. The impression was boxed and poured in two sections; First section is up to the height of contour of the impression of the defect. Orientation grooves were

Figure 2: Prelimnary impression made in alginate.

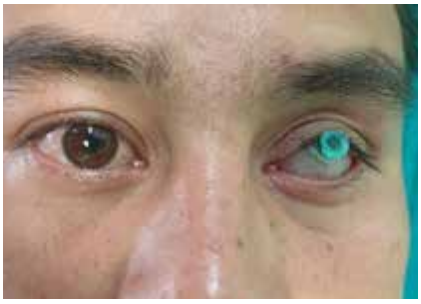


Figure 3: Custom tray fitting.

Figure 4: Impression of the ocular defect made with light-body addition silicone elastomeric impression material.

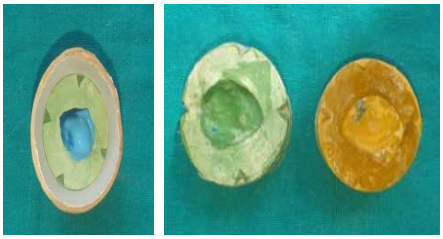


Figure 5: Preliminary molds prepared.

Figure 6: Scleral wax pattern.

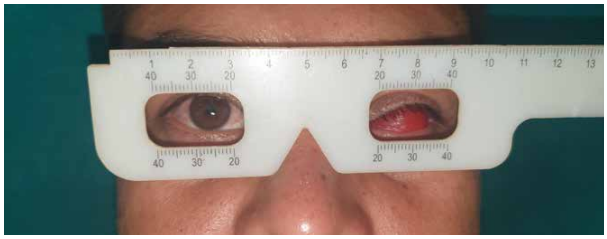


Figure 7: Positioning of the iris with the help of PD ruler.

Figure 8: Scleral wax pattern with iris placement.

Figure 9: Final eye prosthesis.

Figure 10: Before & After.

made on this section and a separating media was applied, second section of the impression was then poured. Once set, the cast was separated and re-assembled in the same position (Figure 5).

The defect site was filled with molten base plate wax. Once the wax solidified (Figure 6), the fit of the wax pattern was observed by gently lifting the lids and observing the extension into the fornixes. A prefabricated stock eye shell, whose iris shade matched with the contra-lateral eye, was selected.

After try-in of the scleral wax pattern, the iris disk was positioned with the help of a PD ruler (PD ruler; Zenni Optical, San Francisco, CA) (Figure 7). The instrument consists of graduated scales situated at the horizontal plane, relative to the axis of the patient's nose. The instrument is positioned by resting the notch on the bridge of the nose and adjusted to accommodate the eye within the ocular aperture. The patient is asked to hold the position of the eye in a normal conversational gaze. The orientation, pupillary distance, and mediolateral dimension of the iris of the companion natural eye were measured from the graduated scale. Multiple readings were taken until consistent measurement was achieved .These measurements were transferred onto the sculpted scleral wax pattern .

The iris button was positioned in the marked area and the established orientation was evaluated for position and symmetry. This confirmed the positioning of the iris in the wax pattern in comparison to the iris of the contra-lateral eye (Figure 8).

The wax pattern was acrylized, and the prosthesis was finished and polished. Further characterization was done by attaching artificial veins to simulate that of the natural eye (Figure 9).

## DISCUSSION

The ocular prosthesis is an artificial replacement for the bulb of the eye. After the surgeon enucleates the eyeball, Prosthodontist is a person who comes into an act of providing the patient with an artificial eye to overcome the trauma of losing an eye. A properly made ocular prosthesis maintains its orientation when patient performs various movements. Moreover the use of stock ocular prosthesis provide better results functionally as well as esthetically. It retains shape of defective socket, prevents collapse of eye lids, provides muscular functions to the eye lids and gives a gaze similar to that of opposite natural eye. Custom made acrylic eye is easy to fit and adjust, unbreakable, inert to ocular fluids, esthetically good, long lasting and easier to fabricate.[6]

In cases of facial asymmetry, accurate marking of the midline could produce subjective errors in this methods, due to the variation in operator's perception. Various methods regarding accurate positioning of the iris and ocular portion of the orbital prosthesis have been described.

Roberts[7] proposed the use of the pupillometer. Joneja et al[8] described the use of window light. Brown[9] used caliper measurements made from the patient's face. Mc Arthur[10] described the use of the ocular locator and fixed caliper for positioning the artificial eye. Benson[11] suggested fabrication of a custom- made acrylic resin and positioned the iris by visual judgment. Jooste[12] described the use of dividers to decide the iris position.Nusinov et al[13] mentioned the technique of inverted anatomic tracings for establishing the orbital tissue contours of the oculofacial prosthesis.

The conventional use of visual assessment being subjective produces inaccurate results.[14] The PD meter provides an accurate registration of alignment of an ocular prosthesis.

This technique requires minimal skill and is very economical. A PD ruler is relatively more convenient than the graph grid technique, since preparation of graph cutouts and transferring landmarks to graph grids is cumbersome.[15,16]

Though the method described here is more precise, it may not be feasible to use the PD ruler in every clinical set-up. This method is not applicable for individuals with hyper-telorism, wherein both eyes cannot be accommodated in ocular apertures of the PD ruler.[17]

## CONCLUSION

The esthetic outcome of the custom-made prosthesis was far better than the stock ocular prosthesis. The procedure used here is simple and cost effective. Although the patient cannot see via this prosthesis, but this prosthesis will increase the self-confidence of the patient to face the upcoming challenges in his life.

## REFERENCES


1. Beumer J, Curtis T A, Marunick MT.Maxillo-Facial Rehabilitation: Prosthodontic and surgical consideration:2ndedition. Ishiyaku Euro America, Inc.1996
2. Taylor TD. Clinical maxillofacial prosthetics. Chicago: Quintessence 2000; p. 233-44.
3. Doshi PJ, Aruna B. Prosthetic Management of patient with ocular defect. J Ind Prosthodont Soc 2005;Vol.5: 37–38.
4. Cain JR. Custom Ocular Prosthesis. J Prosthet Dent 1982;Vol.48: 690-4
5. Mathews MF, Smith RM, Sutton AJ, et al: The ocular impression: a review of the literature and presentation of an alternate technique. J Prosthodont 2000;Vol.9210- 216
6. Bulbulian AH: Facial Prosthetics. Springfield, IL, Charles C Thomas, Publisher, 1973, pp. 353-363
7. Roberts AC: An instrument to achieve pupil alignment in eye prosthesis. J Prosthet Dent 1969;22:487-489
8. Joneja OP, Madan SK, Mehra MD, et al: Orbital prostheses. J Prosthet Dent 1976;36:306-311
9. Brown KE: Fabrication of orbital prostheses. J ProsthetDent 1969;22:592-607
10. McArthur DR: Aids for positioning prosthetic eyes in orbital prostheses. J Prosthet Dent 1977;37:320-326
11. BensonP:Thefittingandfabricationofacustomresin artificial eye. J Prosthet Dent 1977;38:532-539
12. Jooste CH: A method for orienting the ocular portion of an orbital prosthesis. J Prosthet Dent 1984;Vol.51:380- 382
13. Gupta L, Aparna IN, Dhanasekar B, et al: Three-dimensional orientation of iris in an ocular prosthesis using a customized scale. J Prosthodont 2014;Vol.23:252-255
14. Guttal SS, Patil NP, Vernekar N: A simple method of positioning the iris disk on a custom made ocular prosthesis: A clinical report. J Prosthodont 2008;Vol.17:223-227
15. Pai U, Ansari N, Gandage DS: A technique to achieve predictable iris positioning and symmetry in ocular and orbital prostheses. J Prosthodont 2011;Vol.20:244-246
16. Malik P, Rathee M, Singh J: Ocular defect: a prosthodontic challenge. Int J Dent Sci Res 2014;5:120-122
17. Tasmun W, Jaeger E: Duane's Clinical Ophthalmology (ed 1). Philadelphia, Lippincott-Raven, 1995, pp. 1-25

# A Customized Post and Core on Structurally Compromised Endodontically Treated Tooth

Dr Sunita Prajapati,[1] Dr Dinesh Sharma Bhusal,[2] Dr Rewant Rajbhandari[3]

[1]Post Graduate Student, [2]Asst. Professor, [3]Post Graduate Student, Department of Prosthodontics, Kantipur Dental College and Research Center.

**Corresponding Author**
Dr Sunita Prajapati
Email: pztisunita1@gmail.com

**Citation**
Prajapati S, Bhusal DS, Rajbhandari R. A Customized Post and Core on Structurally Compromised Endodontically Treated Tooth. J Kantipur Dent Coll. 2022;3(1):41-3.

## ABSTRACT

The successful treatment of mutilated tooth require an interdisciplinary approach of good endodontic therapy and prosthetic reconstruction of tooth. The main goal of the post is to retain a core that secured the definitive prosthesis. When the tooth's remaining structure is extremely minimal, a post and core aids to prevent fracture. A custom cast post and core are recommended when a significant amount of tooth structure has been lost.This case report highlights the fabrication of customized metal post and core to save maxillary second molar with less crown structure followed by metal crown.

**Keywords:** Custom post and core; endodontic therapy; mutilated tooth; prosthesis.

## INTRODUCTION

The resilience and fracture resistance of teeth that have undergone endodontic treatment typically decreases. Dental cavities, cavity preparation, root canal preparation, and endodontic access are the main causes of tooth structure loss.[1]The selection of an acceptable post-endodontic restorative material can be difficult for endodontically treated teeth because of a big pre-existing restoration or substantial access cavity preparation.[2] Clinicians frequently find hard to make decision whether to use a partial or full coverage crown, a direct or indirect restoration and custom-cast or prefabricated posts. The remaining coronal tooth structure after root canal treatment, tooth's functional needs, aesthetics, patient's age, and the pre-existing periodontal condition; must be taken into consideration when selecting the best post-endodontic restorative material.[3] There are several different post/dowel systems available;cast metal posts, modern fiber posts. For extensive loss of coronal tooth structure,post/dowel is indicated which is generally made up of cast gold or preformed metal pin. In the tooth with multiple canals,post of ideal length must be placed instraight canal and a key must be placed in other canal. The key helps to seat the dowel and stops it from rotating, but it offers little to no retention. Parallelism is impossible in divergent canals, and any attempt to increase retention may result in a perforation.[4]

Figure 1: Preoperative photograph

Figure 2: Preoperative IOPA view

## CASE REPORT

A 37 years old male patient was referred to Department of prosthodontics for placement of crown in right upper back teeth region. On clinical examination, the right maxillary second molar was structurally compromised with extensive tooth loss. (Figure 1)

Intra oral periapical radiograph revealed endodontically treated with adequate periodontal support. The endodontic treatment was satisfactory and no sign of any periapical pathology (Figure 2). A full veneer crown retained by custom made post and core was planned for the tooth after thorough examination.

## CLINICAL PROCEDURES

A Gates Glidden drill was used to remove gutta-percha (GP) from the pulp chamber. A peeso reamer (Perfect

peeso reamers, Dental Perfect) attached on micro motor hand piece was used to remove GP from the palatal canal, the straightest of the three canals, to an established length of 8 mm from the orifice. Similar to this, 3 mm of GP from the disto-buccal canal was removed to prepare the anti-rotational key. With Peeso reamer, a post space was created in the palatal and disto-buccal canal of the tooth. (Figures 3 and 4)

Tooth was roughly prepared for the crown with equi-gingival chamfer finish line. All the unsupported/thin enamel and dentine were removed using a diamond bur. Two tapered sticks of approximately the same diameter as those of the canals were made from self-cure resin (DPI RR coldcure, DPI, India). The stickswere tried in the canals and trimmed until they snugly fit. Root canals surface were coated with a suitable lubricant. An auto-polymerizing resin were applied on the custom-made acrylic posts and replaced into the prepared post spaces. When the material was in dough stage,post was slowly withdrawn and again reseated to prevent binding of acrylic resin into the root canal. During the initial settings of the acrylic resin, the pattern was moved in and out of the canal so that it was not locked into undercuts in the canal. As the resin polymerized, the post was removed from the canal to confirm extension of the bottom of the preparation. The post spaces were lubricated and were seated in place. Another mix of acrylic resin was placed on the exposed part of the stick to provide adequate bulk for the final restoration.The final restoration preparation was completed with the placement ofpost-core pattern. The post-core assembly was carefully removed from the prepared tooth and stored in distilled water until it was invested and casted in metal alloy. (Figures 5 and 6)

The prepared post and core was checked in the tooth by applying light pressure. The core portion of the casting was polished and inserted into the post space by using luting cement (3M ESPE, KetacTM, USA).The post and core was inserted slowly into the canal allowing excess cement to escape away from the post spaces so that post and core were seated completely.(Figure 7)

The preparation was finished and impressions were made with putty and light-body polyvinyl siloxane impression material (Bonasil, DMP,USA) for the maxillary arch and alginate (Plastagin, Septodont,India) for the mandibular arch. The metal crown was fabricated and cemented at subsequent appointments. (Figures 8 and 9)

Figure 3: Post space preparation

Figure 4: Post space preparation IOPA view

Figure 5: Direct post pattern fabrication

Figure 6: Acrylic post pattern

Figure 7: Cast metal post and core

Figure 8: Metal crown cementation

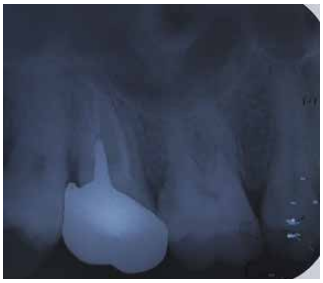


Figure 9: Post and core with metal crown cementation IOPA

## DISCUSSION

Traditionally, root filling material of good quality, using appropriate technique provides an effective seal andcritical for success of root canal obturation. Poor quality of filling material and leakage along the canal will result in failure.[5] Ray and Trope evaluated periapical status of coronal restoration and root canal obturation of endodontically treated teeth on the radiographic. The study found that good post endodontic restoration is critical in the healing of periapical inflammation. Poor restoration and endodontic treatment seldom led to the absence of peri-radicular inflammation. Furthermore, the success rate of incomplete/poor endodontic therapy was only 67.6% followed by satisfactory permanent restoration. In endodontically treated teeth post-endodontic restoration was substantially more important to the success of teeth.[6] It is essential to assess the benefits and drawbacks during treatment planning as variety of post systems are available in the market. Both prefabricated metal posts and cast post-and-cores available are acceptable and successful post materials.[7] Cast posts, whether oval or elliptical, can be utilized in all layouts of canals and confirm the canal shape. Unlike other prefabricated posts, cast posts can be utilized to repair proclined teeth by making a minor adjustment to the core angulation. Gomez Polo et al. conducted a retrospective study, to assess the cumulative survival rate of teeth restored with prefabricated posts and cast post-cores. Study concluded that the survival rate was 83% in a mean of 10-year follow up.[8] Cast posts with a higher modulus of elasticity were favored in the absence of ferrule because there was less tooth structure available for bonding. Da Silva et al mentioned that metal crown restorations with no ferrule, showed better biomechanical performance in cast post and cores than glass fiber posts. The combination of numerous mechanical parameters determines the mechanism of failure andfracture resistance of replaced teeth.[9] However, cast posts are recommended in some clinical circumstances such as; teeth without cervical stiffness or in teeth with considerable destruction, absence of ferrule or cannot be obtained.The stiffness of post and core materials does not significantly affect the strain values and fracture resistance when enough dentin was present.

## CONCLUSION

There is no specific post-and-core system or final restoration can be applied in every clinical circumstance. We must therefore comprehend these variables and the fundamental principles of how to employ them for the patient's maximum benefit and comfort. Selection of good post is crucial for the success of teeth restoration.As much tooth structure must be preserved as possible. Restoration with customized post and core is efficient and also offers a viable substitute for the rehabilitation of severely broken or decayed teeth.

## REFERENCES


1. Reeh ES, Messer HH, Douglas WH. Reduction in tooth stiffness as a result of endodontic and restorative procedures. J Endod. 1989;15(11):512-6.
2. Burke FJ. Tooth fracture In vivo and in vitro. J Dent. 1992; 20:131-92.
3. Naumann N, Kiessling S, Seemann R. Treatment concepts for restoration of endodontically treated teeth: A nationwide survey of dentists in Germany. J Prosthet Dent. 2006;96:332-8.
4. Shillingburg HT, Jr., Fisher DW, Dewhirst RB. Restoration of endodontically treated posterior teeth. J Prosthet Dent. 1970;24(4):401-9
5. Swanson K. Chiles SA. An evaluation of coronal microleakage in endodontically treated teeth. Part II. Sealer types. J Endod. 1987; 13:109-12
6. Ray HA, Trope M. Periapical status of endodontically treated teeth in relation to the technical quality of the root filling and the coronal restoration. Int Endod J. 1995;28(1):12-8.
7. Peroz I, Blankenstein F, Lange KP. Restoring endodontically treated teeth with post and cores-A review. Quintessence Int. 2005;9:737–46.
8. Gómez-Polo M, L lidó B, Rivero A, Del Rio J, Celemín A. A 10-year retrospective study of the survival rate of teeth restored with metal prefabricated posts versus cast metal posts and cores. J Dent. 2010;38(11):916-20.
9. Da Silva NR, Raposo LH, Versluis A, Fernandes-Neto AJ, Soares CJ. The effect of post, core, crown type, and ferrule presence on the biomechanical behavior of endodontically treated bovine anterior teeth. J Prosthet Dent. 2010;104(5):306-17.

# Prevalence of Oral Diseases in Rural Area of Punjab, India

Dr Arshnoor Singh Bajaj,[1] Dr Harmandeep Kaur[2]

[1,2]Intern, S.G.R.D Institute of Dental Sciences and Research, Amritsar, India

**Corresponding Author**
Dr Arshnoor Singh Bajaj
Email: arshnoorbajaj@gmail.com

**Citation**
Bajaj AS, Kaur H. Prevalence of Oral Diseases in Rural Area of Punjab, India. J Kantipur Dent Coll. 2022;3(1):44-5.

## ABSTRACT

Oral health plays significant role in general health. The shortage of dental health care providers can lead to reduced utilization and poor oral health. A cross-sectional study was conducted among 300 participants using WHO-Oral Health Assessment Form in two villages of Panjab. The study reported; occurrence of dental caries in 70%, bleeding on probing in 85.6%, presence of periodontal pocket in 67% and loss of attachment in 32.6%. The prevalence of dental diseases is still high in rural areas of Punjab; therefore, creating awareness and improving access to dental services can help to enhance the status of oral health in rural populations.

**Keywords:** dental caries, periodontal disease, prevalence, rural population

## INTRODUCTION

Oral health holds a very important role in the general well-being of a population. Even though health awareness has improved immensely with modern advances still a large population remains devoid of adequate dental services especially in the rural areas of a developing country like India. Poor utilization and inaccessibility of dental services are major challenges which are affecting the enhancement of dental health care in the population. More than fifty percent of populations in India are residing in rural areas however, two-third of dental professionals are serving in urban areas. The shortage of dental health care providers can lead to poor oral health and decreased availability to oral health services. Thus, the objective of this study was to assess the prevalence of carious lesions and periodontal problems in rural populations.

## MATERIALS AND METHODS

A cross-sectional study was conducted in the village of Mallunangal and Kathunangal, Punjab, India. A total of 4 dental camps were organized in different rural areas and 300 patients were examined. World Health Organization Oral Health Assessment form were used; Decayed, Missing, Filled teeth (DMFT) index and Community Periodontal Index (CPI) were assessed through oral examination. A team of two professors and ten dental interns participated in the camps and was supervised by the Public Health Dentistry Department of S.G.R.D Institute of Dental Sciences and Research. Mobile dental van was taken to camp site to provide basic dental services. Data was collected by using assessment form and clinical examination. Descriptive analysis and comparison tables were prepared by using Microsoft Excel-2007.

## RESULT

Among 300 participants; 192 were male and 108 were female with the age range of 10 to 60 years. Among them, 30(10%) were below the age of 20 years, 120(40%) in the age group of 21-30 years, 84(28%) in the age group 31-40 years, 96(32%) were above the age of 40 years. The prevalence of dental caries was 210 (70%) in study population. 140 (72.9%) male and 70 (64.8%) female participants showed carious teeth.

Around 90 participants (30%) of the total cases had no caries which depicted good oral health of the people. Among total sample; 72 participants (24%) had DMFT index of 1 as very mild caries, 68 people (22.6%) with 2-3 DMFT index as mild caries, 47 people (15.6%) had DMFT score between 4 to 5 as moderate carious teeth and 23 participants (7.6%) were found to have severe carious teeth with the exposure of dentine and DMFT score of 6 and above (Table 1).

The periodontal examination was done by using CPITN probe. Bleeding on probing was present in 257(85.6%) among the examined sample. Among them 145(48.3%)

Table 1: Extent of dental caries present in the study population

| DMFT Score | Caries severity | Number | Percentage |
|---|---|---|---|
| 0 | No Caries | 90 | 30% |
| 1 | Very mild | 72 | 24% |
| 2-3 | Mild | 68 | 22.6% |
| 4-5 | Moderate | 47 | 15.6% |
| 6 and more | Severe | 23 | 7.6% |

Table 2: Periodontal Index in the study population

| Periodontal Index | Gender | | N(%) |
|---|---|---|---|
| | Male | Female | |
| Bleeding on probing | 145(48.3%) | 112(37.3%) | 257(85.6%) |
| Periodontal pocket | 103(34.3%) | 98(32.6%) | 201(67%) |
| Loss of Attachment | 53(17.6%) | 45(15%) | 98(32.6%) |

male and 112 (37.3%) female showed bleeding on probing. 201(67%) participants had periodontal pockets of varying depths. Loss of attachment was present in 98 (32.6%) among the study sample (Table 2).

## DISCUSSION

The prevalence of oral diseases are high in the rural areas due to several reasons. Almost all participants were reported to have plaque deposits and were completely unaware of healthy brushing techniques and showed lack of awareness. Rural populations tend to have lower levels of education which can result in lack of understanding of the importance of oral health and proper dental care. Furthermore, rural areas often have limited access to dental services which can result in higher rates of untreated oral problems. Also, dental care resources; such as toothbrush, dental floss and fluoridated tooth paste are usually not readily available in remote areas and can lead to poor oral hygiene practice. A diet with high sugar content, starch and carbohydrates are common in rural areas which can lead to higher rates of tooth decay. Rural populations also have higher rates of tobacco and alcohol consumption which can contribute to oral health problems such as gum disease and oral cancer. Overall, these can be the possible factors that contribute to a higher prevalence of oral health problems in rural areas, which can have a significant impact on quality of life and overall health. Thus, creating awareness and improving access to dental services can be the solutions to these issues.

## CONCLUSION

The prevalence of oral diseases is high in rural areas mostly due to the lack of awareness and proper access to dental services. Therefore, improvement in these particular areas can help enhance the overall status of oral health in rural populations.

## SOURCES


1. Baiju RM, Peter E, Varghese N, Sivaram R. Oral Health and Quality of Life: Current Concepts. 2017;11(6).
2. WHO Oral Health Survey. Basic methods.1997; 4th edition.
3. Zimmermann H, Hagenfeld D, Diercke K et al. Pocket depth and bleeding on probing and their associations with dental, lifestyle, socioeconomic and blood variables: a cross-sectional, multicenter feasibility study of the German National Cohort. BMC Oral Health. 2015;15(7).
4. Coelho M. ICDAS and dmft/DMFT. Sensitivity and specificity, the importance of the index used: a systematic review. Journal of Dentistry & Public Health. 2020;7.
5. Mittal N, Singh N, Kumar N. Prevalence of Dental Caries among Smoking and Smokeless Tobacco Users Attending Dental Hospital in Eastern Region of Uttar Pradesh. Indian Journal of Community Medicine.2020;45(2):209-14.
6. Verma S, Gupta N, Sharma S, Gill JS, Khurana A. Correlation between Diet and Dental Health. Review Article.International Journal of Science and Healthcare Research. 2021;262:6(1).
7. Kapoor D, Gill S, Singh A, Kaur I, Kapoor P. Oral hygiene awareness and practice amongst patients visiting the Department of Periodontology at a dental college and hospital in North India. Indian J Dent.2014;5(2):64–8.
8. Attin T, Hornecker E. Tooth brushing and oral health: How frequently and when should tooth brushing be performed. Oral Health Prev Dent. 2005;3(3):135-40

# Journal of Kantipur Dental College
# Author Guideline

## INTRODUCTION

The Journal of Kantipur Dental College (JKDC) is a peer reviewed, open access biannual biomedical journal. It is the official journal of Kantipur Dental College.

The JKDC works under the belief that knowledge gained through scientific research and advances should be shared and accessible. It publishes research-based articles within the field of biomedical sciences including basic sciences and clinical disciplines, public health, health care management, medical education, ethical and social issues pertaining to health care. Hence, it grants readers permission to read, download, copy, distribute, print, search and create links to the full text articles available online at www.kantipurdental.edu.np/journal without any charge. Thereby, it also aims to increase the visibility and ease of use of open access scientific and scholarly articles so as to promote their increased usage and impact. Authors do not have to pay for submission, processing or publication of articles in JKDC.

Articles are published under the following categories: Editorials/Guest editorial, Research/Original Article, Review Article, Case Report/Series, Short Communication, Book review, View point and Student KDC.

## THE EDITORIAL PROCESS

The submitted manuscripts are duly acknowledged and initially reviewed for probable publication by the editors with the confirmation that they are being submitted only to the JKDC, have not been published, simultaneously submitted or accepted for publication elsewhere.

The manuscripts are then sent to expert peer reviewers blinded to the contributor's identity and vice versa for review and comments. The final decision on whether to accept or reject the article are taken by the Chief-editor based on the peer reviewer's comments. The authors are informed about the modification/acceptance/rejection of the manuscript with the peer reviewer's comments. Revised articles have to be resubmitted after making the necessary changes or clarifying questions made during the peer review process. The author may withdraw his/her manuscript prior to publication with written applications.

The accepted articles are edited for grammatical, punctuation, print style and format errors and page proofs and are sent to the corresponding author who should return them within stipulated date. Non response may result in delay in publication or even rejection of the article.

## INSTRUCTIONS TO AUTHORS

Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts submitted to Biomedical Journals" developed by the International Committee of Medical Journal Editors (ICMJE) www.icmje.org. The uniform and specific requirements of JKDC are summarized below. Before sending a manuscript authors are requested to check for the instructions.

## SPECIFICATION OF THE MANUSCRIPT

The language of the manuscript should be simple and legible, which must be written in British English or English (US) without grammatical, typographical and bibliographical errors. The manuscript must be proof-read before submission. Manuscript should use proper language that serves the purpose of effective communication. Manuscript should not be written in contraction. For example: can't, don't, etc.

Format: Microsoft Word (.doc or .docx) file format and all the illustrations, figures and tables should be placed within the text at the appropriate points.

Front Size/Style: 12/Times New Roman Spacing: 1.5 Border spacing: 1 inch (all sides)

Page number: Right hand bottom

Image file format: jpeg or tiff/ Resolution: 300 dpi (dot per inch)

All manuscripts must be type written and submitted to the Chief Editor, JKDC. The total number of authors including Principal author should not be more than 6(Six). Authors must submit manuscripts through email in the following address: jkdcjournal@gmail.com

## TYPES OF MANUSCRIPT AND WORD LIMITS

### RESEARCH ARTICLE

Research article should be divided into these sections:

**Title**

Title should be short not more than 15 words.

**Authorship**

It should contain name of the pertinent authors with their position and affiliated institution and e-mail address of corresponding author.

**Abstract**

It should not exceed 300 words and should be in a structured summary. All research articles should be submitted with the following subheadings: Introduction, Objective, Materials and Method, Result and Conclusion.

**Keywords:** 3-7 keywords arranged alphabetically separated by semicolons.

**Introduction**

Introduction should clearly state the problem being investigated, the background and reasons for conducting the research. It should summarize relevant research to provide context and also state how the work differs from published work. It identifies the research questions/ hypothesis that has to be answered and also explains others' findings.

**Materials and Method**

This section should provide sufficient details about the procedure, research design, sample selection, so that readers can understand and replicate the study. It should explain inclusion and exclusion criteria. It should give details of new methodology or give citation for previously published work.

**Result**

This should provide answer to research question/ hypothesis. Findings can be shown in tables and figures, and explain what was found. Presentation of results shall not be duplicated in multiple formats.

**Discussion**

Discussion should describe what the present results mean and what is already known about the subject. It should indicate how the results relate to expectations and new scientific knowledge. It also identifies the gaps and ideas for further study.

**Conclusion**

A concise conclusion which should briefly explain the importance and usefulness of the work.

**Acknowledgement**

All contributors who do not meet the criteria for authorship can be listed.

**References**

References should be listed in a separate reference section immediately following the text in Vancouver superscript system. The total number of references should not exceed 30.

**Word limit**

Manuscript 2500 words including figures and tables (excluding abstract and references)

**Review Article**

Review article must cover various aspects of the topic chosen, areas of interest and should also incorporate latest researches and findings. It should be systemic critical assessments of literature and data sources. It should include; Title up to 15 words, Abstract 300 words (structured/ unstructured), Manuscript up to 3000 words excluding references and References up to 50. There shall be no conclusion section, if needed summary section can be added.

**Case Report/Series**

New/interesting/ rare cases with clinical significance or implications can be reported. Valid written expressed consent should be taken prior to involving any person in case report manuscript. The identity of the patient should not be revealed in text or figures. Confidentiality should be maintained. It should include; Title 15 words, Abstract 150 words (structured / unstructured) with key words 3-5 arranged alphabetically separated by semicolons.

Manuscript should be1500 words (excluding abstract and references). The total number of references should not exceed 15.

**View Point /Short communication / Book review**

These articles are personal or professional views and allow the author to express their own point of view on any issues relevant to health. It should include; Title 15 words and total 1000-1500 words.

**Student KDC**

Student KDC section is provisioned for dental students for submitting manuscript on research/survey, case report, essay and articles on career and web-searches. Total word count should be 1000-1500 words.

**Images (photographs, drawings)**

If images (photographs/ line drawings) are to be included, clearly scanned images free from technical artefacts should be submitted. Magnifications, areas of key interest should be indicated by an arrow, symbol or abbreviation the details of which should be explained at the bottom of the figures. The scanning resolution should be 300 dpi (dots per inch). Title or captions and clearly numbered for each image should be provided. Figure/s should be cited in order within the text, e.g. (Figure 4).

**Tables**

Tables should be simple and legible. It should present only essential data with a title or caption and clearly numbered. Table/s should be cited within the text, e.g. (Table 3).

**Units and abbreviations**

All measurements should be expressed in Standard International (SI) units. Avoid abbreviations in the title and abstract. All unusual abbreviations should be fully explained at their first occurrence in the text.

**Drug names**

Generic drug names should be used.

**Conflict of Interest Notification**

This should be notified (if any).

**Ethical consideration**

Manuscripts submitted for publication should be attached with ethical clearance letter from the respective institutional ethical committee or review board.

**Informed consent**

Informed consent of the patients must be taken before they are considered for participation in the study. Patient identifying information such as names, initials, hospital numbers or photographs should not be included in written descriptions. Patient consent should be obtained in written and archived with authors.

**Protection of human subject in research**

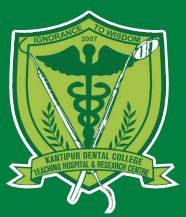
When conducting experiments on human subjects, appropriate approval should be obtained from the Ethical Committee. All the procedures on human experimentation must be performed in accordance with the ethical standards of the responsible ethical committee (both institutional and national) and the Helsinki Declaration of 1964 (as revised in 2008).

**Permission**

Authors must obtain written permission for the borrowed and previously published material and submit them with the manuscript. The borrowed material should be acknowledged.

Checklist for authors before submitting the manuscript

- ✓ Covering letter
- ✓ Completely filled JKDC declaration of authorship
- ✓ Ethical committee approval
- ✓ Informed consent (if appropriate)
- ✓ Abstract
- ✓ Manuscript files including tables/figures/ pictures
- ✓ References
- ✓ Word count (Abstract/Text)





# Kantipur Dental College

## Teaching Hospital & Research Center

Dhapasi, Basundhara Ring Road (Near Police Bit), Kathmandu-3, Nepal

**Tel:** 977-01-4385910, 4385911 (Hospital), 977-0-14366242/4358586 (College)

**Toll Free No.**: 16600171111; **Fax:** 977-01-4385912

**E-mail:** kdchktm@gmail.com **Website:** www.kantipurdental.edu.np