ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research

Vol. 16, Issue, 07, pp.29332-29336, July, 2024
DOI: https://doi.org/10.24941/ijcr.47514.07.2024

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

COMPARATIVE STUDY OF DIFFERENT FACTORS INFLUENCING THE OPTIMAL OBTURATION OF PRIMARY TEETH WITH OR WITHOUT COTTON COMPRESSION

[1]*Dr. Savitha Sathyaprasad and [2]Dr. Reshma Ramdas Pai

[1]HOD, Dept. of Pediatric and Preventive Dentistry, KVG Dental College, Sullia
[2]Post Graduate Student, Dept. of Pediatric and Preventive Dentistry, KVG Dental College, Sullia

ARTICLE INFO

Article History:
Received 18th April, 2024
Received in revised form
19th May, 2024
Accepted 25th June, 2024
Published online 30th July, 2024

Key words:
Obturation, Deciduous teeth,
Cotton Compression.

***Corresponding author:**
Savitha Sathyaprasad

ABSTRACT

Background: The quality of the obturation plays a significant role in the success of endodontic treatment. The ultimate goal of endodontic obturation is to create a fluid-tight seal along the length of the root canal system from the coronal opening to the apical termination. ***Aim:*** To evaluate factors affecting an optimal obturation during different obturating technique with or without cotton compression in primary teeth. ***Materials and methods****:* A total of 48 primary 2nd molar requiring obturation after standard BMP were included, and were divided into 4 groups of 12 each. Group 1-incremental technique, Group 2-lentulo spiral technique, Group 3-mechanical syringe without cotton compression, Group 4- mechanical syringe with cotton compression. The obturation quality and the presence of voids was evaluated using the modified Coll and Sadrian criteria. All the readings were entered and statistically analysed. ***Results****:* Among the 4 groups lentulospiral and mechanical syringe with cotton compression showed maximum optimally filled canals and least number of voids. Maximum number of voids and underfilled canals were seen with mechanical syringe without cotton compression. ***Conclusion****:* Lentulo spiral & mechanical syringe with cotton compression showed optimal obturation in terms of extent of obturation and absence of voids when compared to incremental & mechanical syringe without cotton compression.

Citation: Dr. Savitha Sathyaprasad and Dr. Reshma Ramdas Pai, 2024. "Comparative study of different factors influencing the optimal obturation of primary teeth with or without cotton compression.*". International Journal of Current Research*, 16, (07), 29332-29336.

INTRODUCTION

Maintaining each primary tooth as a fully functional component of the dental arch is the primary goal of pulp therapy for primary dentition. This promotes appropriate occlusion, mastication, phonation, and swallowing, as well as the maintenance of the space needed for the emergence of the permanent successor teeth and to get rid of any negative psychological effect that could be induced by tooth loss.[1] Deciduous teeth are highly vulnerable for pulpal diseases due to anatomical susceptibility like thinner enamel,reduced thickness of the dentin between the pulp chambers and the enamel, highly placed pulp horns with larger pulp chamber compared to crown, presence of accessory canals, increased vascularity leading to faster spread of infection along with rampant disease like early childhood caries.[2] Study done by Avery et al as showed most of children require pulp therapy as early as at age of 2 because of early involvement of pulp and pulpectomy is the most common pulp therapy procedure for removal of the complete pulp tissue that is irreversibly infected or necrotic due to caries or trauma. Various factors have to be considered like canal morphology which is thin and tortuous, lateral branching, connecting fibrils, apical ramifications, and partial fusion of the canals, continuous resorption of root causing change in the position of apical foramen, the proximity of the succedaneous tooth, placememt of furcation more occlusally, biomechanical preparation, the type of obturating material used, as well as the technique for obturating the root canals for achievement of a good hermetic seal with minimum voids.[3] The success of endodontic treatment and the vitality of the tooth are compromised if any step in the endodontic and restorative procedure is inadequate.[4] Several techniques have been used to obturate the root canals of primary teeth such as Endodontic pressure syringe, Lentulo spiral, Mechanical syringe, Incremental filling technique, Jiffy tube, Tuberculin syringe, Disposable injection technique, Reamer technique, Insulin syringe technique, Navitip, Bi-directional spiral, Pastinject and Other techniques are Amalgam plugger, Paper points, Plugging action with wet cotton pellet.Numerous investigations have been carried out to determine the optimal obturation technique and root canal filling material, but the results have been unclear.[5] An ideal obturation should have no voids with good hermatic seal with proper coating of canal wall and three-dimensional obturation of the radicular space sealingapically, coronally, and laterally ending at the radiographic apex or up to 2 mm short of the apex to avoid any problems related to over obturation like persistent pain after the recovery period, swelling and inflammation around treated

teeth, direct contact between excess filling material and nerve tissue leading to potential discomfort or numbness and deviation of permanent tooth bud.[6]The process of cleaning and shaping determines both the degree of disinfection and the ability to obturate the radicular space. Obturation is therefore a reflection of the cleaning and shaping and is evaluated on the basis of length, taper, densityand the coronal seal.[7] Compressing the obturating material with a wet cotton pellet ensures good condensation in the canal and allows contact with the apical tissues. Also helps to avoid incorporation of voids in the obturation and proper sealing of the canals.[8] The ultimate goal of endodontic obturation is to create a fluid-tight seal along the length of the root canal system from the coronal opening to the apical termination. Various studies have been conducted to find out the ideal root canal filling material and best technique of obturation but they all have been inconclusive.[9] So, this study aimed to compare different factors influencing the optimal obturation of primary teeth including cotton compression.

MATERIALS AND METHODS

A total of 48 primary 2nd molar requiring obturation after standard BMP were included, and were divided into 4 groups of 12 each.

Inclusion criteria

- Lower deciduous second molar requiring pulpectomy with good root length.
- Non vital teeth with irreversible pulpitis

Exclusion criteria

- Teeth more than one third of root resorption
- Teeth with signs of root canal obstruction
- Teeth which are non-restorable
- Teeth showing mobility, periapical cyst, perforation of floor of pulp chamber.

- Standardized baseline intraoral periapical radiographs was taken prior to the start of the treatment. After administering a local anesthetic, pulpectomy was performed following isolation with a rubber dam.
- Before gaining access, all caries was excavated and the pulp chamber was de roofed using a sterile round bur followed by working length determination.
- The biomechanical preparation was done using K-files from size 10 to 35 with frequent saline irrigation. The canals were then dried and obturated using either of the four different techniques mentioned.
- A homogenous mixture of ZOE according to manufacturer's instructions, was used for filling the root canals.

Group 1- incremental technique: A thick ZOE paste was introduced to the canal using a canal-sized plugger with a stopper. The endodontic plugger's length was equal to the root canal's planned operational length minus two millimetres. The blocks each measuring 2 mm were added in increments as long as the canal was obturated up to the cervical region.[11]

Group 2- lentulo spiral technique: The ZOE paste was delivered into the root canals using a 21mm Lentulo spiral of size 30 mounted on a slow-speed contra-angle handpiece (1000 rpm). ZOE paste was applied to the Lentulo spiral, which was then placed into the canal, rotated clockwise, and then withdrawn while it was still turning. The process was repeated until the canal was filled with cement and the material then pressed lightly with a wet cotton pellet into the canal.[11]

Group 3: **Mechanical syringe without cotton compression**: Using an 2ml LA syringe, prepared root canals was obturated with ZOE paste that has been blended to a creamy consistency. The syringe was filled with the homogenous ZOE paste mixture, the needle was placed 2 mm short of the apex.[12]

Group 4: **Mechanical syringe with cotton compression:** Using an 2ml LA syringe, prepared root canals was obturated with ZOE paste that has been blended to a creamy consistency. The syringe was filled with the homogenous ZOE paste mixture, the needle was placed 2 mm short of the apex. This was followed by compression with small wet cotton pellet.

Post endodontic restoration was done with glass ionomer cement and obturation was evaluated using the same radiographic settings described for the preoperative radiographs and the obturation quality and the presence of voids was evaluated using the modified Coll and Sadrian criteria:

- **Underfilling (score 1):** canal filled >2 mm short of the apex.
- **Optimal filling (score 2):** canal filling ending at the radiographic apex or <2 mm short of the apex.
- **Overfilling (score 3):** filling outside the root apex
- Voids- radiographic presence or absence of voids was evaluated in each canal and tabulated.

All the scores were noted and entered in the excel sheet and were subjected to statistical analysis.

RESULTS

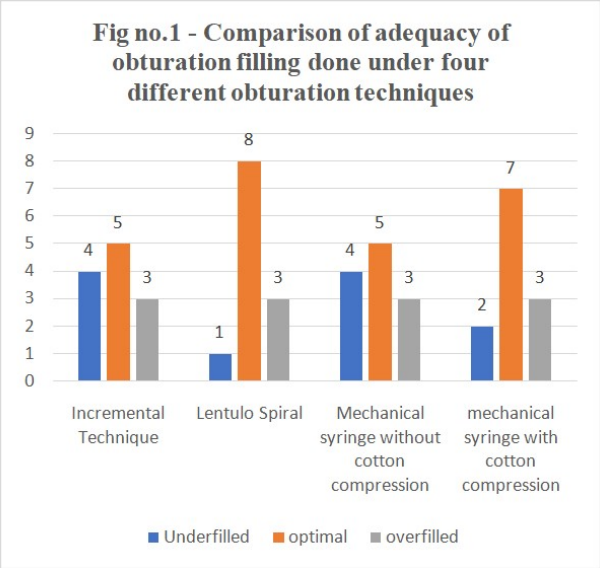
The assessment of canals with different obturation techniques showed that group 2(lentulo spiral) exhibited highest number of optimally filled canals (66.6%), followed by group 4 (mechanical syringe with cotton compression,58.3%) and group 1(incremental technique, 41.6%) & group 3 (mechanical syringe with cotton compression, 41.6%). Although the highest number of underfilled canals was observed in both group 1(incremental technique, 33,3%) and group 3(mechanical syringe with cotton compression,33.3%) followed by group 4(mechanical syringe with cotton compression, 16.6%) and group 2(lentulo spiral, 8,3%). On the other hand, with respect to overfilled canals similar results were observed in group 1(incremental technique), group 2(lentulo spiral), group 3(mechanical syringe without cotton compression) and group 4((mechanical syringe with cotton compression) [Table 1, fig 1]. The highest number of voids was observed in the canals filled with mechanical syringe without cotton compression (group 3) and least number of voids in the canals filled with mechanical syringe with cotton compression (group 4). Over all 8 teeth out of 12(66.6%) showed voids when filled with mechanical syringe without cotton compression (group 3), and 7 teeth out of 12 showed voids when filled with incremental technique (group 1), whereas in lentulo spiral (group 2) obturation 3 teeth out of

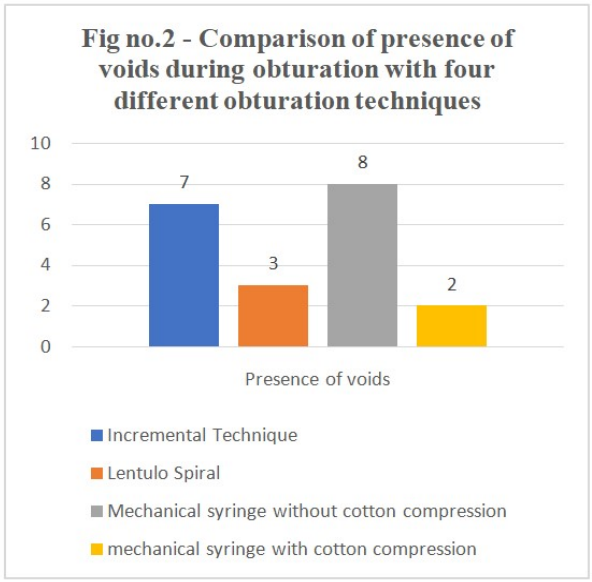
Table 1. Comparison of adequacy of obturation filling done under four different obturation techniques using chi square test

Obturation technique	Incremental technique		Lentulo spiral		Mechanical syringe without cotton compression		Mechanical syringe with cotton compression		p- value
Adequacy of Filling	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
Underfilled	4	33.3%	1	8.3%	4	33.3%	2	16.6%	0.3641
Optimal	5	41.6%	8	66.6%	5	41.6%	7	58.3%	0.612
Overfilled	3	25%	3	25%	3	25%	3	25%	1

Table 2. Comparison of presence of voids during obturation with four different obturation techniques using chi square test

Presence of voids	Incremental technique		Lentulo spiral		Mechanical syringe without cotton compression		Mechanical syringe with cotton compression		P – value
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	
	7	58.33%	3	25%	8	66.6%	2	16.6%	0.0412





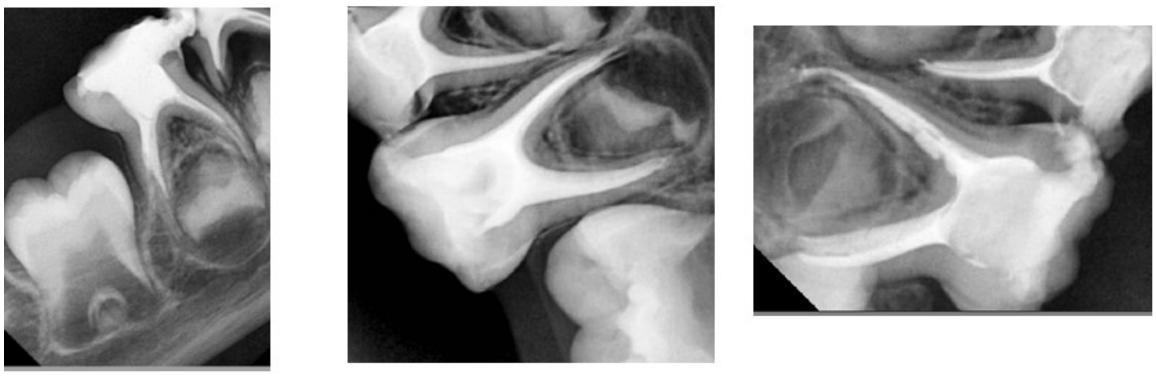


Figure 1: group 1 a) underfill b) optimal fill c) overfill

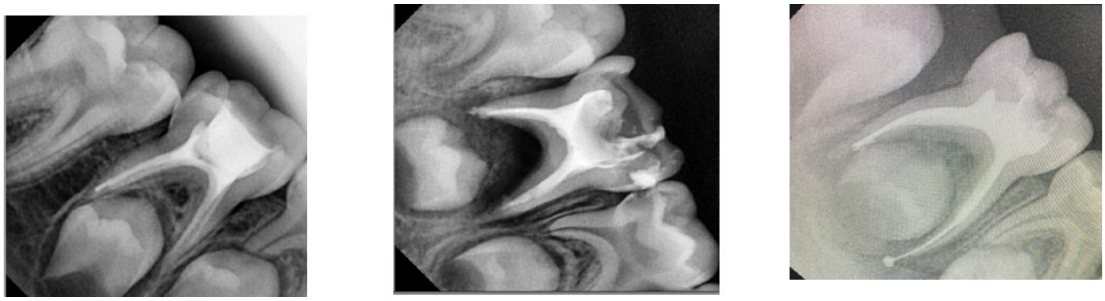


Figure 2. Group 2 a) underfill b) optimal fill c) overfill

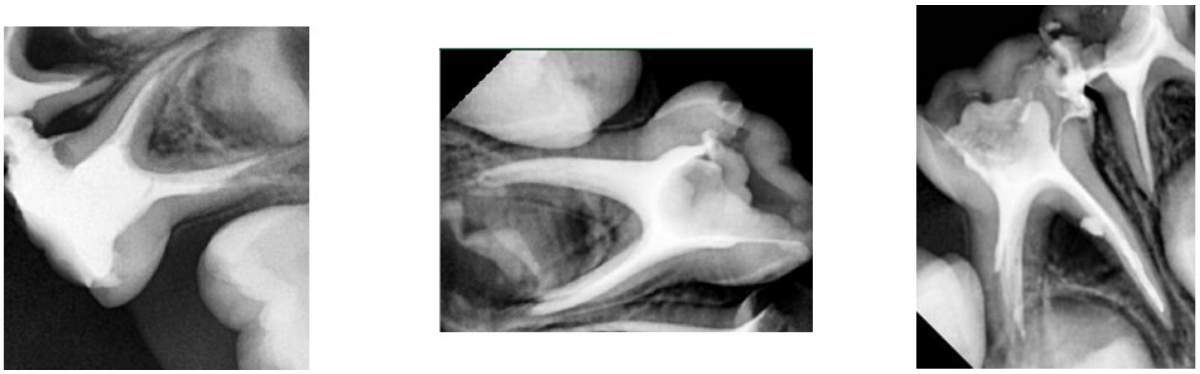


Figure 3. Group 3 a) underfill b) optimal fill c) overfill

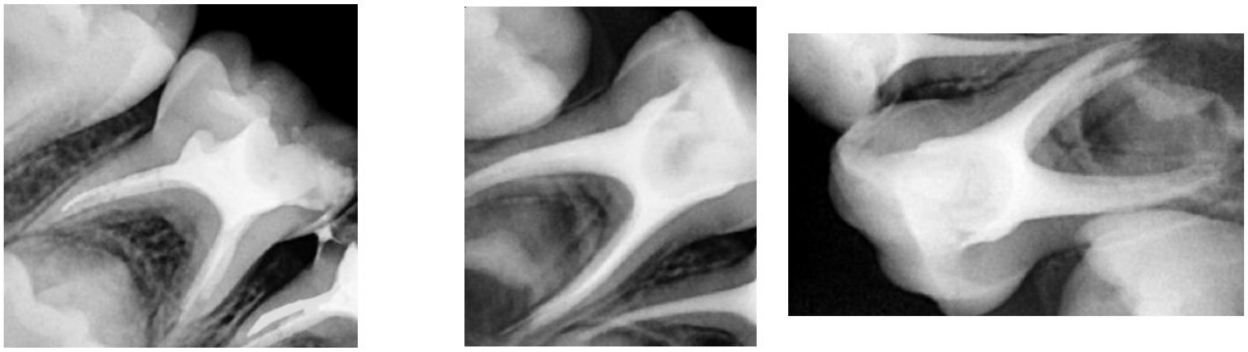


Figure 4. Group 4 a) underfill b) optimal fill c) overfill

12(25%) showed voids and 2 teeth out of 12 showed voids when filled with mechanical syringe with cotton compression (group 4) [Table 2, Fig 2].

DISCUSSION

Management of infected primary teeth not only involves debridement of the root canal & filling the root canal with an obturating material that is biocompatible and would resorb at the same rate as the root of the concerned tooth.[13] It is essential to have a better quality of obturation as it minimizes the risk of apical percolation and coronal leakage.[14] Quality of obturation plays an important role in primary teeth as it is not easy to thoroughly debride microbes from the numerous accessory canals present in the root canal of primary teeth. The ultimate goal of any obturating material is to adapt to the walls of the canals and fill the root throughout its length without overfilling.[15-18] In the present study, the ZOE paste was used as obturating material due to its universal usage & low cost&beneficial properties such as anti-inflammatory and analgesic properties that are beneficial after a pulpectomy procedure.[19] The outcome of the study was measured based on the quality assessment and a number of voids present in the canal with modified Coll &Sadrian criteria. In this study, highest percentage of underfilled canals and voids was observed with mechanical syringe without cotton compression. The reason for this might be limited flexibility &the thicker tip of the needle used with the anesthetic syringe, which makes it difficult to reach the apex of the narrow, curved primary tooth canals that might lead to voids. In addition, entry of air into the cartridge during obturation leads to void formation. The highest number of optimal fill & least number of voids were noticed with lentulo spiral due to flexible design which allows it to carry the material uniformly throughout the curved and narrow canals of primary molars.

It is in accordance to the study done byMemarpour et al. Similar results were seen when obturation was done followed by wet cotton compression (group4) as the obturation starts from apex upward, leaving no room for entrapment of air & formation of voids. (bhandari et al). Compressing the obturating material with a wet cotton pellet ensures good condensation in the canal and allows contact with the apical tissues. Also helps to avoid incorporation of voids in the obturation and proper sealing of the canals. In present study, overfilling of material was observed in all the 4 groups but not statistically significant (pvalue=1). This might be due to improper working length determination, over instrumentation, condensing of material beyond 2mm short of apex & thin consistency of obturating material. (cohen et al). Over obturation can lead to persistant pain, swelling, inflammation and deviation of underlying permanent tooth bud.[3] Thus, for an ideal obturation major factor to be considered is the canal morphology which is thin and tortuous leading to inadequate preparation of the canal asthis step determines both the degree of disinfection and the ability to obturate the radicular space. Obturation is therefore a reflection of the cleaning and shaping.[6]

CONCLUSION

Lentulospiral and mechanical syringe with cotton compression have proved to be superior to incremental technique and mechanical syringe without cotton compression in optimal obturation of the primary root canals without presence of voids.

REFERENCES

1. Gandhi M, Tandon S, Vijay A, Kalia G, Rathore K. 2017. Clinical assessment of various obturating techniques for

primary teeth: A comparative study. Journal of clinical and diagnostic research: JCDR. Jul;11(7):ZC48.
2. McDonald and Avery's Dentistry for the Child and Adolescent – 10 TH EDITION
3. Cohens pathways of pulp, 11th edition
4. Jha M, Patil SD, Sevekar S, Jogani V, Shingare P. 2011. Pediatric obturating materials and techniques: *A review. J Contemp Dent.,* 1:27-32.
5. Dalsania R, Arora A, Singla K, et al. 2020. Obturating techniques in pediatric dentistry: Literature review. *J Curr Med Res Opin.,* 16:3.
6. Pediatric endodontics- current concepts in pulp therapy for primary and young permanent teeth, Anna B Fuks.
7. Pediatric dentistry , infancy through adolescence, Arthur J Nowak 6th edition.
8. Nagar P, Araali V, Ninawe N. 2011. An alternative obturating technique using insulin syringe delivery system to traditional reamer: An in vivo study. *J Dent Oral Biosci*., 2:7-9.
9. Kalaskar RR, Thosar N, Kalaskar AR. 2021. Insights of Primary Teeth Root Canal Obturation Techniques: A Mini Review. *Annals of the Romanian Society for Cell Biology*. Apr 10:2169-75.
10. Ellana Jermiah J, Rao A, Srikant N, Rao A, Suprabha BS.2019. Comparative evaluation of three obturating techniques in primary molars: an in vivo study. *Journal of Clinical Pediatric Dentistry*. 1;43(6):372-5.
11. Chandrasekhar S, Prasad MG, Radhakrishna AN, Saujanya K, Raviteja NV, Deepthi B, Ramakrishna J. 2018. A comparative In vivo efficacy of three spiral techniques versus incremental technique in obturating primary teeth. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. 1;36(1):71-5.
12. Bhandari SK, Prajapati U. 2012. Root canal obturation of primary teeth: Disposable injection technique. *J Indian Soc Pedod Prev Dent.,* 30:13.
13. Priyadarshini P, Gurunathan D. 2020. Comparative evaluation of quality of obturation using endoflas and endoflas powder with aloevera gel as obturating materials in primary mandibular molars: a double blinded randomized controlled trial. *J Complement Med Res*., 11(3):203–213. DOI: 10.5455/jcmr..11.03.27.
14. Ranly DM, Garcia-Godoy F. 2000. Current and potential pulp therapies for primary and young permanent teeth. *J Dent*., 28(3):153–161. DOI: 10.1016/s0300-5712(99)00065-2
15. Rewal N, Thakur AS, Sachdev V, et al. 2014. Comparison of endoflas and zinc oxide eugenol as root canal filling materials in primary dentition. *J Indian Soc Pedod Prev Dent.,* 32(4):317–321. DOI: 10.4103/0970 4388.140958 11.
16. Rajasekhar S, Mallineni SK, Nuvvula S, et al., 2019. Comparative evaluation of three obturation systems in primary molars–a randomized clinical trial. *J Indian Soc Pedod Prev Dent.*, 37(3):297–302. DOI:10.4103/ JISPPD.JISPPD_276_18 .
17. Gandhi M, Tandon S, Vijay A, et al., 2017. Clinical assessment of various obturating techniques for primary teeth: a comparative study. *J Clin Diagn*., 11(7):ZC48–ZC51. DOI: 10.7860/JCDR/2017/25818.10194 .
18. Chandrasekhar S, Prasad MG, Radhakrishna AN. et al., 2018. A comparative In vivo efficacy of three spiral techniques versus incremental technique in obturating primary teeth. *J Indian Soc Pedod Prev Dent*., 36(1):71.
19. Rajasekhar S, Mallineni SK, Nuvvula S. 2019. Comparative evaluation of three obturation systems in primary molars–A randomized clinical trial. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. Jul 1;37(3):297-302.
20. Hiremath MC, Srivastava P. 2016. Comparative evaluation of endodontic pressure syringe, insulin syringe, jiffy tube, and local anesthetic syringe in obturation of primary teeth: An in vitro study. *Journal of Natural Science, Biology, and Medicine*., Jul;7(2):130.

****