



Re Mineralise the Demineralised: How Knowledgeable and Aware are our Dentists in Kashmir Related to this Minimally Invasive Technique

Mohsin Sidiq^{1*}, Sana Farooq¹ and Nazia Lone¹

¹*Department of Pedodontics and Preventive Dentistry, Government Dental College Srinagar, India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i46B32948

Editor(s):

(1) Dr. Rafik Karaman, Al-Quds University, Palestine.

Reviewers:

(1) M. Ambika, Vinayaka Mission's Research Foundation, India.

(2) Jayanthi P, Azeezia Dental College, India.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/75429>

Original Research Article

Received 07 August 2021

Accepted 15 October 2021

Published 22 October 2021

ABSTRACT

The principles of minimal invasive dentistry clearly dictates the need for developing effective measures to remineralize the early enamel caries lesions.

Aim: The aim of the study was to access how knowledgeable and aware the dentist in Kashmir were related to the minimal invasive dentistry.

Methodology: A cross sectional study was done on 60 interns and junior residents of Government Dental College Srinagar who were prescribing medicines in the OPD. This survey was to assess how knowledgeable, aware the dentists are while prescribing the re mineralising agents and do they detect the incipient carious lesions early.

Results: 80% had observed a white spot lesion as a hypomineralization spot while examining the patient. 67% of the dentists said that Fluoride based remineralising agents are the most easily available remineralising agent in the market.

Conclusion: Dental caries pathophysiology is not a simple continual cumulative loss of tooth minerals but also a dynamic process characterised by alternating periods of demineralization and re mineralisation and can be reversed by the application of various remineralising agents.

Keywords: MID (Minimal invasive dentistry); hypomineralization.

1. INTRODUCTION

According to Ismail et al in 1992 remineralisation refers to the treatment of an active initial carious lesion by stopping its progression towards a cavitated stage and bridging the gaps between the traditional preventive and invasive dentistry [1]. Fluoride is the most commonly used remineralising agents which is available in the form of gels, varnishes, pastes, fluoride releasing materials and not only decrease mineralization but also increase the remineralization of the tooth structure when the patient maintains good oral hygiene[2]. Though the use of newer chemoprophylactic agents like Chlorhexidine, triclosan, antimicrobial peptides, probiotics, replacement therapy, bacteriophage therapy, photo dynamic theory and sugar substitutes may help in preventing the demineralisation but the use of remineralising agents help in creating a favourable environment to prevent progression of dental caries[3].

Both fluoridated and non fluoridated agents are used as remineralizing agents however fluoridated agents increase enamel resistance and rate of maturation, cause mineralisation of incipient lesions and form interface with microorganisms thus improving the tooth morphology [4].

2. MATERIALS AND METHODOLOGY

A cross sectional study was conducted on 60 interns and junior residents of Government Dental college and Hospital, Srinagar, Kashmir who were prescribing medications in OPD. The inclusion criteria consisted of those dentists who prescribed medication to the patients on daily basis and had completed their pediatric dentistry posting. A whatsapp based survey was conducted on them using a validated questionnaire that included the demographic details and survey items to evaluate the knowledge, attitude and practice of the Remineralising agents as a minimal invasive dental technique through a survey application 'Survey Monkey'. The data was collected and subjected to analysis.

3. RESULTS

A total of 10 pre tested questions were whatsapped to the junior residents and interns at Government Dental College and Hospital

Srinagar who were prescribing medicines to the patients. The survey was whatsapped to 70 interns and junior residents of the college amongst which only 60 responded after repeated reminders. Among 60 participants who participated in the study 27% (n=16) were Males and 73% (n=44) were Females (Fig. 1) (Table 1 Q1).

53% percentage (n=32) of the respondents were well aware of the definition of the remineralising agents and 80% had observed a white spot lesion as a hypomineralisation spot while examining the patient. 7% weren't sure whether it was fluorosis or hypomineralised spot (Fig. 2) Table 1 Q3.

59% were aware about the duration of using 1.23% APF gel whereas 31% were confused that the application is annual (Fig. 3 Q4).

87% (n=52) of the dentists were aware that remineralising agents are available in the market as varnish, toothpaste, gels, chewing gums, etc (Fig. 4, Table 1 Q5).

67 percent of the dentists knew the trade names of the remineralising agents available in the market like tricalcium phosphate is available as Clinpro crème, bioactive glass as Novamin, Unstabilized calcium phosphate as Enamelon. Stabilized calcium phosphate system as Tooth mouse, Recaldent and Calcium sucrose phosphate as Toothmin (Table 1).

Fluoride based remineralising agents are the easily available remineralising agents in the market as answered by n=40 (67%) of dental graduates.

61% of the dental graduate said that arginine/theobromine based, self assembling peptides and polydopamine based from grape seed extract were the various recent advances in remineralising agents.

50% of the dentist were well aware of ozone heal as a remineralising agent and 33 percentage of them knew about ozone as a minimal invasive technique but not as a remineralising agent (Fig 6, Table 1 q10).

45% of respondents considered fluoride based remineralizing agents as the best.

S no	Question	Option A	Option b	Option C	
1	What is your gender?	Male	Female		
2	Are you aware of definition of remineralising agents?	Biomimetic approach to stabilise bioavailable calcium, phosphate and fluoride and localised designs to non cavitated lesions	Biomimetic minimum invasive dentistry where ions are stabilised in the cavity lesions	Biomimetic approach to stabilise the bioavailable ions to boost cavitated and non cavity lesions	
3	Have you ever spotted a hypermineralized spot or white Lesion?	Yes	No	Maybe	
4	How long and frequently do you prescribe APF gel ?	4 minutes every 3/6 monthly	2 minutes seminannually	4 minutes annually	2 minutes annually
5	In which of the following forms remineralising agents are available in the market?	Chewing gum	Vanish	Toothpaste	Gels
6	Which of the following trade names the remineralising agents are available as?	Stabilised calcium phosphate system as Tooth mouse,Recaldent	Calcium sucrose phosphate as Toothmin	Tri calcium phosphate as Clinpro cream	Bioactive Glass as Novamin and unstabilized calcium phosphate as Enamelon
7.	Which of the following do you consider as the most efficient re mineralising agents?	Fluoride based	Calcium sucrose phosphate based	CPP-ACP based	Self assembling peptide
8	Which of the following Reminalising agent is easily available in the market?	CPP-ACP based	Calcium sucrose phosphate beast	Fluoride beast	None of the above
9	Which of the following is a recent advance in in remineralising agents ?	Arginine, theobromine based	Polydopaminebased from grape seed extract	Self assembling peptides	All of the above
10	Is ozone used as a re mineralising agent?	Yes as ozone Heal	No	Ozone is a minimally invasive technique but not used as a re mineralising agent	

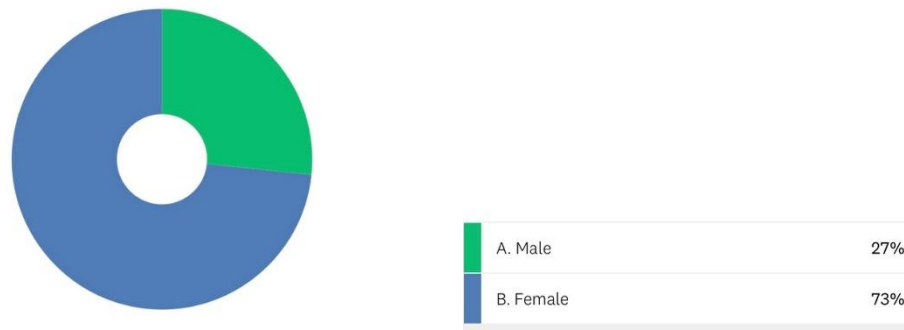


Fig. 1. Pie diagram showing the percentage of male and female predisposition in the study

Table 1. Options marked in the survey

	A % (n)	B% (n)	C% (n)	D% (n)	E% (n)	SKIPPED
Q1	27% (16)	73%(44)				
Q2	53% (32)	10% (6)	37% (22)			
Q3	80% (48)	13% (8)	7% (4)			
Q4	59% (34)	10% (6)	31% (18)	0(0)		2
Q5	0	3%(2)	0	10% (6)	87% (52)	
Q6	13% (8)	13% (8)	3% (2)	3% (2)	67% (40)	
Q7	45% (26)	14% (8)	34% (20)	7% (4)		2
Q8	13% (8)	13% (8)	67% (40)	7% (4)		
Q9	14% (8)	7% (4)	18% (10)	61%(34)		4
Q10	50% (30)	17% (10)	33% (20)			

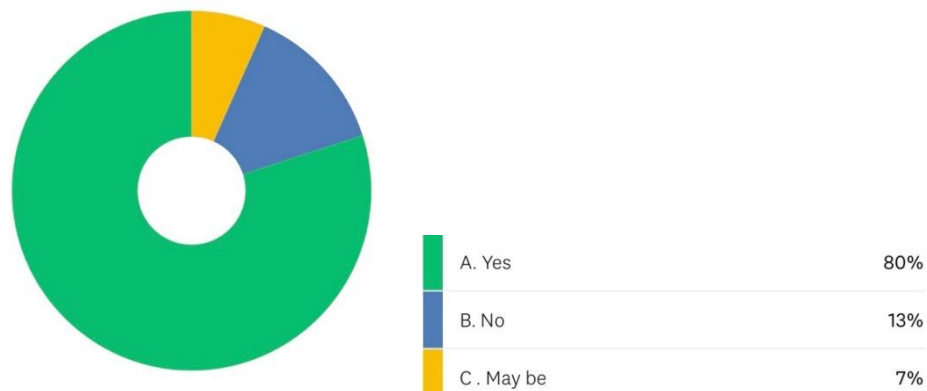


Fig. 2 Q3. Pie diagram showing percentage of respondents who had spotted white spot lesion

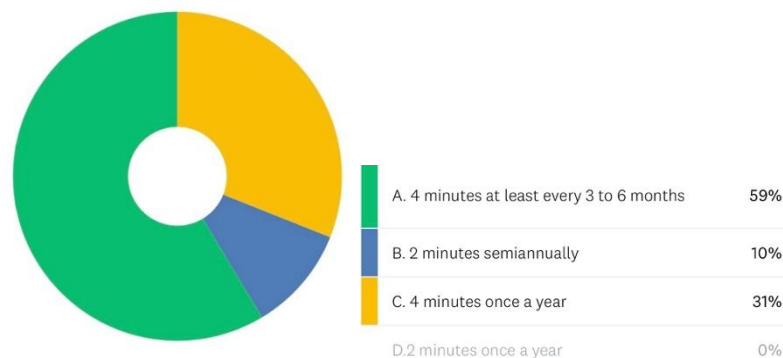


Fig. 3 Q4. Pie Diagram showing duration and frequency of using APF gel

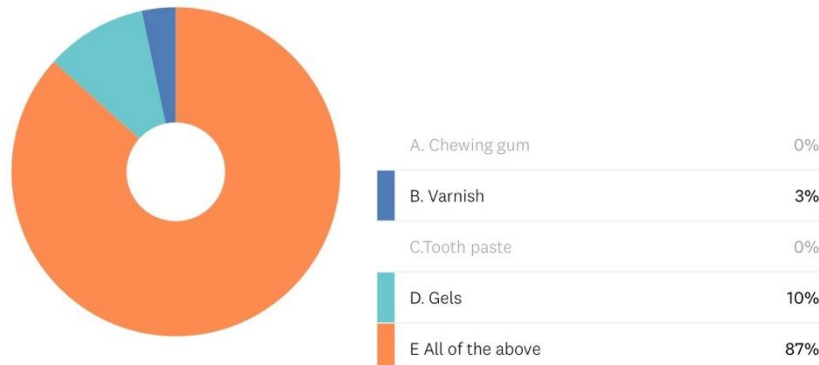


Fig. 4, Table 1 Q5. Pie diagram showing vehicle of availability of Remineralising agent

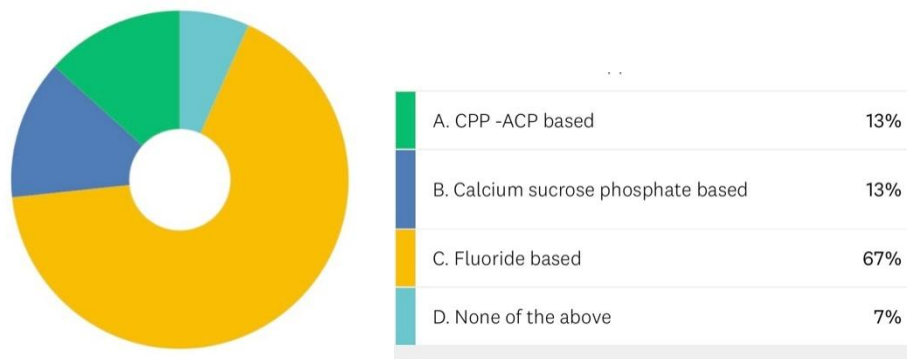


Fig. 5, Table 1 Q8. Pie diagram showing the response to the most commonly available remineralising agent

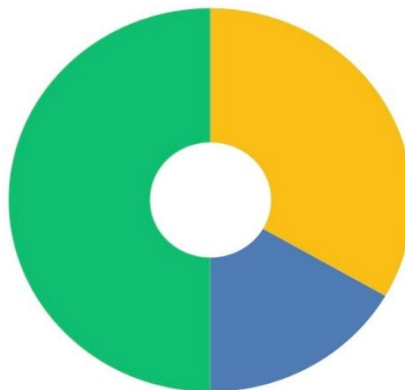


Fig. 6, Table 1 q10. Pie diagram where green denotes response of ozone being a remineralising agent

4. DISCUSSION

The basic principles of Minimal intervention dentistry in the management of dental caries are modification of oral flora, patient education, remineralisation of cavitated lesions of enamel and dentin, minimal intervention of cavitated lesions and repair of defective restorations. High caries risk group, patients with gastric reflux

disorders, orthodontic patients, patients with white spot lesions of enamel and bleaching and teeth whitening are the indications for patients to undergo remineralising agents as a preventive therapy [5].

The ideal requirements these agents possess are that they diffuse into the sub surface to deliver calcium and phosphate , dont favour

calculus formation, work in acidic pH and xerostomias and boost the remineralising properties of the saliva[6].

The various non fluoridated agents used as remineralising agents are casein phosphopeptide amorphous calcium phosphate (CPP-ACP) as recaldant, tooth mousse, tri calcium phosphate as Clin PRO, Bioactive glass as Novamin, xylitol, unstabilized calcium phosphate with sodium fluoride as Enamelon, arginine, bicarbonate calcium carbonate complex as Cavistat, grape seed extract, ozone as Healozone, calcium carbonate carrier as Sensistat. 67 percent of the dentists were aware and knowledgeable about the trade name of the various remineralising agents available in the market.

The use of Enamelon toothpaste which is based on ACP technology was first of all developed in the year 1999 by Dr Tung to remineralise the sub surface enamel lesion's[7].

Novamin was introduced in dentistry by Gary Hack and Dr Lenlitkowsky which is the bioactive glass containing silica sodium oxide calcium oxide which bind to the exposed dentin surface to form a protective layer to fill the open dentinal tubules [8].

The calcium sucrose phosphate based remineralising agents contains higher concentration of calcium and phosphate and inhibit the formation of plaque [9,10].

Tri calcium phosphate as best remineralising agents like ClinPro is a new hybrid material created by milling technique which fuses beta tricalcium phosphate and sodium lauryl sulfate or fumaric acid and it's seen that the products available with tricalcium phosphate include 5000 ppm of sodium fluoride dentifrice and 5% fluoride varnish. They have seen to provide a superior surface and sub surface remineralization when compared with 5000 ppm fluoride and CPP ACP[11].

Gurunathan D in 2019 conducted a questionnaire based survey on dental practitioners regarding CPP-ACP as a preventive tool and 80% had better knowledge about basics of CPP-ACP [12]. Whereas Bhat R in 2020 conducted an online questionnaire to check the awareness of the dental interns related to the minimal invasive dentistry, its concepts and it was seen that the fluoride was most recommended treatment for prevention of caries [13].

Hamdan AM in 2012 conducted a survey on general dentists and orthodontists to assess their knowledge related the preventing and treatment of white spot lesions associated with orthodontic treatment and it was seen that 76% of orthodontist recommended the use of using in office fluoride treatment for patients with severe white spot lesions immediately after orthodontic treatment[14].

BIOMIMETIC remineralising agents like self assembling peptides are considered to be very helpful in caries prevention as self assembling peptide P11-4 commercially available as Curo lox and Curodont Repair were developed for the in depth biomimetic treatment of the initial carious lesions [15].

5. CONCLUSION

In recent times the focus of dentistry has been shifted towards the conservative approach and to minimal intervention and maximum treatment outcomes. Remineralising agents are the most preferred option for the regeneration of the lost of structure as well as a preventive approach in treatment of incipient caries by decreasing the expenses and the suffering of the patient. Over the period of time there have been development of recent advances in the remineralising agents from the use of fluorides initially to the recent biomimetic remineralising products and use of self assembling peptides, hesperidine, strawberry guava, polyamides theobromine and hydroxyapatite crystals. Research needs to be done in this field to prevent the demineralizing potential and help in progression of the minimal invasive dentistry for the betterment of technology for optimal responses and results.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

An ethical clearance was taken from the institution to conduct the survey in the said institution.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ismail AI, Broadeur JM, Gagnon P, Payette M, Picard D, Hamalian T, et al. Prevalence of non cavitated and cavitated lesions in random sample of 7 to 9 year old school children in Montreal, Quebec. *Commun Dent Oral Epidemiol.* 1992;20 (5):250-255
2. Venkatesan K, Ranjan M. Remineralising agents in dentistry: a Review. *IOSR Journal of Dental and Medical Sciences.* 2014 ;13(4):57 – 60
3. Hegde S, Roma M, Shetty D. Non fluoridated remineralization agents in dentistry .*J Pharm Sci. and Res.* 2016;8(8):884-887
4. Rather SH, Kazi S, Kazi S. The role of remineralising agents used in dentistry; An update then and now. *Saudi Journal of Biomedical Research.* 2020;5(7):183 -187
5. Tyagi SP, Garg P, Sinha DJ ,Singh UP .An update on demineralizing agents. *J Interdiscip Dentistry* 2013;3:151 -8
6. Arifa MK., Ephraim R, et al. Recent advances in dental hard tissue remineralization: A review of literature. *Int J Clin Pediatr Dent.* 2019;12 (2):139 -144
7. Tung MS, Eichmiller FC. Gentle applications of amorphous calcium phosphates. *J Clin Dent.* 1999;10:1 -6
8. Greenspan DC .Novamin and tooth sensitivity -an Overview .*J Clin Dent.* 2010;21:61 -65
9. Jamdar AB, Uppin VM, Pujar M, et al. Comparative evaluation of different remineralising agents on the microhardness or bleached enamel surface and in vivo study. *Paripex -Indian Journal of Research.* 2018; 6(12).
10. Reema SD, Lahira PK, Roy SS. River keys in posco peptide amorphous calcium phosphate. *Chin J Dent res.* 2014;17:7-14.
11. Naveena P, Nagaratna C, Shakuntala BK. Remineralising agent - then and now - an update. 2014;4(9):256.
12. Gurunathan D. Knowledge and attitude among dentists regarding CPP-ACP as a preventive tool. *International Journal of public health research and development.* 2019 ;10(11).
13. Bhat R, Shetty P, Ariwala F, Hegde H, Kini A. Awareness and practices of minimal invasive dentistry among dental interns -a descriptive analysis. *Journal of evolution of medical and dental Sciences.* 2020;9(32): 2270 -2274.
14. Hamdan AM, Maxfield BJ, Tufekci E, Shroff B, Lindauer SJ. Preventing and treating white spot lesions associated with orthodontic treatment: a survey of general dentists in orthodontics. *The Journal of the American Dental Association.* 2012;143 (7):777 -783
15. Jablonski MA, Nothelfer R, Morawietz, Korbmayer Steiner H. Impact of self assembling peptides in remineralization of artificial early lesions adjacent to the orthodontic brackets. *Scientific reports.* 2020;1-10.

© 2021 Sidiq et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle4.com/review-history/75429>