

Knowledge, Attitude and Practice regarding dental pulp treatment in teaching sector of South Punjab

MEHWISH RAFIQ¹, JAFFAR HUSSAIN BUKHARI², MALIK SALEEM SHAUKAT³, MEHVISH SALEEM⁴, ANAM TAHIR⁵, SHAMIMA ABDULLAH⁶

¹Demonstrator Dental Materials, Nishtar Institute of Dentistry, Multan

²Assistant Professor of Dental Materials, Nishtar Institute of Dentistry, Multan

³Professor of Dental Materials, Multan Medical and Dental College, Multan

⁴Assistant Professor of Dental Materials, Bakhtawar Amin Medical and Dental College, Multan

⁵Assistant Professor of Dental Materials, CIMS Dental College, Multan

⁶Assistant Professor of Community Dentistry, Bakhtawar Amin Medical and Dental College, Multan

Correspondence to: Dr. Jaffar Hussain Bukhari, Email: jbukhari@yahoo.com, Cell: +92317-6639798

ABSTRACT

Objective: This study had four-fold objective; to evaluate the dentists' choice about removal of caries, to know the preferred material for direct and indirect pulp capping and to find out the influence of clinical experience, post-graduation and workplace on treatment modalities.

Methodology: A cross-sectional study was performed on 460 dentists belonging to dental colleges of South Punjab. Non-probability convenience sampling was done. Information about work experience, post-graduation and workplace, caries removal, direct and indirect pulp capping material was collected. SPSS version 22 was used to analyze data. Frequencies, percentages and association of treatment options with other variables were found out.

Results: Out of 429 participants, 50% selected to remove total caries and restore temporarily in first visit then permanent filling in second. Calcium hydroxide was the most preferred material (61%) for direct pulp capping, whereas for indirect, it was a combination of CH, GIC and adhesive, also opted by post-graduates significantly more than graduates ($p=0.02$). No association of work experience and post-graduation had no association with questions about treatment modalities ($p = 0.19$ and 0.16 respectively). In private sector, first treatment option and a combination of CH, GIC, adhesive and composite for indirect capping was opted significantly more than public sector ($p=0.03$ and $p=0.02$ respectively), whereas, for direct capping CH was opted significantly more in public than private ($p=0.01$).

Conclusion: The preferred treatment was the complete caries removal and temporary filling in first visit followed by permanent filling in second. Calcium hydroxide was the material of choice for pulp capping, also significantly more in public sector than private. In deep cavities, the combination of CH and GIC was preferred for lining under composite resin. The work experience and post-graduation of dentists had no significant influence on treatment options or material used for pulp capping.

Keywords: Biodentine, pulp capping, calcium hydroxide, mineral trioxide aggregate

INTRODUCTION

The pulp is a soft tissue forming inner structure of tooth and containing nerve and blood vessel.⁽¹⁾ A number of times, the pulp exposure to the oral environment happens as a result of caries, trauma or crown preparation and requires either Direct Pulp Capping (DPC) or indirect Pulp Capping.⁽²⁾ Before 1990s, DPC has been an emergency measure until permanent treatment by RCT.⁽³⁾ Advancement in technology and introduction of newer endodontic materials changed the approach of dental practitioners to treat the exposed pulps. It has been confirmed by researchers an appropriate biologic seal maintained against seepage of saliva results in healing capability of pulp through cell rearrangement and tertiary dentin formation.⁽⁴⁾

The success of the treatment depends on pulp status which is evaluated by pulp vitality testing. Data suggests that pulp vitality testing is enormously conflicting and varying.⁽⁵⁾ For that reason, the outcomes of DPC have been focused with diverse and controversial opinions. Furthermore, each dentist has different treatment approaches for the success of DPC.^(6,7)

The choice of dental material predicts the prognosis of vital pulp therapy. Several materials are available for pulp capping procedure. In early 20th century, Calcium Hydroxide (CH) has been the material of choice for DPC⁽⁶⁾ but it has a number of disadvantages, like insufficient adherence to dentin, resorption of the material, mechanical weak, risk of micro leakage⁽⁸⁾ and liquefaction necrosis of the surface of the pulp due to high pH.⁽⁹⁾

Silicate-based materials like Biodentine and Mineral trioxide aggregate (MTA) have also been used for pulp capping.^(10, 11) In clinical practice, MTA is a preferred alternative to CH as it stimulates the formation of dentin-bridge faster, which allows pulp healing. MTA has a high pH of 10.2 initially which reaches to 12.5 in 3 hours and this, in turn, attributes to the antimicrobial action of MTA. However, some studies show no significant clinical difference between MTA and CH.⁽⁶⁾ Nonetheless, it possesses some troubling disadvantages such as prolonged setting time and

higher material cost. Alternative calcium-silicate-based restorative cement is Biodentine having similar indications as that of MTA. Biodentine can be directly applied as a bulk dentin substitute in the cavity without the need for preconditioning and it also has a shorter setting time.⁽¹²⁾ Moreover, it can be easily manipulated due to its high viscosity.⁽⁹⁾

For restoration of deep cavities dental composite has been taken as a material of choice.⁽¹³⁾ Due to possible toxic effects of composite in deep cavities, CH and glass ionomer cements (GIC) had been suggested, for an indirect pulp capping under these restorations.^(14, 15) Recently, EndoSequence root repair material (ERRM) and TheraCal have been introduced as a pulp capping materials. TheraCal is tricalcium-silicate-based material which releases calcium. It has advantages of easy handling, no prior dentine conditioning and short setting time.^(16, 17) ERRM is biocompatible⁽¹⁸⁻²⁰⁾ and insoluble, as well as it produces caustic CH when coming into contact with water.

This study has been planned for the assessment of dentists' preferences, working in the teaching institutes of South Punjab, regarding dental pulp treatment, caries removal modalities and direct/indirect pulp capping material under composite fillings. Furthermore, to assess whether clinical experience and post-graduation has any influence on the choice of material and method for pulp protection.

METHODOLOGY

This was a cross-sectional study, performed from 15th April to 10th May 2022 among dentists working in teaching sector of south Punjab. There are four private and one public sector dentistry colleges in this region. In this study sampling used was non-probability convenience type. A total of 460 dentists, working in above cited colleges constituted the target population. Among those 460 questionnaires were distributed and 429 recovered after two consecutive visits. A close-ended questionnaire was used to collect the data after the assurance of confidentiality. The

questions were asked regarding demographic data, caries removal modalities (partial or complete) and permanent filling in first visit or in second after temporary one. A question about the use of material for DPC in accidental exposure during dental practice was also included. The study was done after some modification in the questionnaire used previously in a similar study in teaching institutions of Rawalpindi with the author's prior permission.

Data analysis was done with SPSS version 22. Initially, frequencies were found out. Then Chi-square test was applied to calculate the association of work experience, post-graduation and workplace with treatment modalities. A significant difference was considered with $p < 0.05$ and confidence interval of 95% was set.

RESULTS

In the predetermined time, out of 460 distributed questionnaires in targeted institutions, 429 filled questionnaires were retrieved. Rate of response was 93%. Table 1 shows the frequencies and percentages of studied variables. Majority of the participants were female (55%). In relation to clinical experience, majority of participants had less than five years (66%).

It was found in present study that 50% responders opted to remove total caries and filling temporarily in first visit and filling permanently in second. In response to the indirect pulp capping material, 'CH+GIC+Adhs+Comp' treatment option was opted by majority (45%). However those having post-graduation, preferred this option significantly higher than those with no post-graduation ($p=0.02$) given in table 2. Furthermore, 61% preferred to use CH and 29% selected MTA as a material of choice for DPC. Regarding association of work place with DPC material, CH was significantly more preferred in public sector than private and MTA in private sector than public ($p=0.01$).

No association of clinical experience with treatment options ($p=0.19$) and indirect pulp capping material ($p=0.33$) was found out. Also, no association of post-graduate qualification with clinical questions was found ($p=0.16$), given in table 2. In private sector, first treatment option and a combination of CH, GIC, adhesive and

composite for indirect capping was opted significantly more than public sector ($p=0.03$ and $p=0.02$ respectively), whereas, for direct capping CH was opted significantly more in public sector than private ($p=0.01$), given in table 3.

Table 1 Frequencies of studied variables

Variable	Frequency (N)	Percentage %
Gender		
Male	194	45
Female	235	55
Graduation time		
<5years	264	61
<10 years	71	17
>10 years	94	22
Place of work		
Private	281	65
Public	148	35
Clinical experience		
<5years	282	66
6-10years	84	19
11-20years	63	15
Post-graduation		
Yes	152	36
No	212	49
Trainee	56	15
Treatment option		
TR+PR2	216	50
TR+PR1	42	10
PR+PR2	156	36
PR+PR1	14	4
Indirect pulp capping		
CH+Adhs+Comp	84	20
CH+GIC+Adhs+Comp	193	45
GIC+Adhs+Comp	95	22
Adhs+Comp	15	3
Don't use	42	10
Direct pulp capping		
CH	260	61
MTA	125	29
BD	35	8
ERRM	4	1
Theracal	5	1

Table 2 Association of dental pulp treatment options and material for direct/indirect pulp capping with post-graduation and work experience

Variable	Post-graduation			P value	Work Experience			P value
	Yes (%)	No (%)	Trainee (%)		<5years (%)	6-10 (%)	11-20 (%)	
Treatment option								
TR+PR2	81	104	31	0.164	141	43	32	0.197
TR+PR1	10	29	3		31	7	4	
PR+PR2	54	72	30		102	32	22	
PR+PR1	7	6	1		8	1	5	
Indirect pulp capping								
CH+Adhs+Comp	35(23)	43(20.3)	6(9.2)	0.02	47	19	18	0.339
CH+GIC+Adhs+Comp	67(44.1)	92(43.4)	34(52.3)		130	40	23	
GIC+Adhs+Comp	30(19.7)	41(19.3)	24(37)		69	12	14	
Adhs+Comp	8(5.3)	7(3.3)	0		9	4	2	
Don't use	12(7.9)	29(13.7)	1(1.5)		27	9	6	
Total	152	212	65					
Direct pulp capping								
CH	89(58.6)	146(68)	25(38.5)	0.00	179(63.5)	42(50)	39(62)	0.00
MTA	40(26.3)	55(25.9)	30(46.2)		88(31.2)	28(33)	9(14.3)	
BD	19(12.5)	8(3.8)	8(12.3)		12(4.3)	10(12)	13(20.7)	
ERRM	3 (2)	1(0.4)	0		0	2(2.5)	2(3)	
Theracal	1 (0.6)	2(0.9)	2 (3)		3(1)	2(2.5)	0	
Total (DPC)	152	212	65		282	84	63	

TR=Total removal, PR=Partial removal, PR1= Permanent restoration in 1st visit, PR2=Permanent restoration in 2nd visit

Table 3 Association of dental pulp treatment options and material for direct/indirect pulp capping with work place

Variable	Work place		P value
	Private (%)	Public (%)	
Treatment option			
TR+PR2	146 (52)	70 (47.3)	0.03
TR+PR1	34 (12)	8 (5.4)	
PR+PR2	91 (32.5)	65 (43.9)	
PR+PR1	10 (3.5)	5 (3.4)	
Total	281	148	
Indirect pulp capping			
CH+Adhs+Comp	47 (16.7)	37 (25)	0.02
CH+GIC+Adhs+Comp	130 (46.3)	63 (42.6)	

GIC+Adhs+Comp	62 (22.1)	33 (22.3)	0.02
Adhs+Comp	15 (5.3)	0	
Don't use	27 (9.6)	15 (10.1)	
Total	281	148	
Direct pulp capping			
CH	164 (58.4)	96 (64.9)	0.01
MTA	91 (32.4)	34 (23)	
BD	17 (6)	18 (12.1)	
ERRM	4 (1.4)	0	
Theracal	5 (1.8)	0	
Total	281	148	

CH=Calcium hydroxide, MTA=Mineral trioxide aggregate, BD=Biodentine, ERRM=Endo-sequence root repair material

DISCUSSION

In the present study, there was dropout of 7% due to unavailability and non-filling of questionnaires by the dentist at the time of survey. The findings of present study endorsed that dentists' work experience and post-graduate qualification had no effect on their selection of pulp treatment techniques and materials used for it.

Regarding preferred treatment modalities, majority of the respondents' preference was total caries removal and temporary filling replaced by permanent one, in other clinical session ($p=0.03$), favored by the previous study done in Rawalpindi.⁽²¹⁾ However, Weber et al reported that recent graduates opted partial caries removal more frequently than total caries removal, contrary to present study in which 50% fresh graduates preferred total removal and 36% partial removal.⁽²²⁾

One query was selection of lining material under composite restoration in case of deep cavity, majority opted to use CH in combination with GIC ($p=0.02$). It might be due to improved healing of dental pulp by protecting it from leachable contents of GIC. Previous studies reported the use of this combination by 40% of the participants, endorsing the findings of the present one (45%).

MTA and Biodentine are used for DPC in the majority of western countries, whereas in Pakistan, majority of the dentists use CH which is supported by similar Pakistani studies.^(21, 23) Findings of the present study confirmed that majority of the participants (69%) selected CH while only 29% opted for MTA. These findings are in accordance with other researches.^(6, 24) It suggested that irrespective of inflammatory response of the pulp CH was the most selected material for direct capping of pulp. Most likely the reason behind this could be, the training of the participants during their clinical education, ability of CH to form reparative dentine and cost effectiveness and continuation of learnt techniques.⁽²¹⁾

Preferred use of CH over bioceramics for DPC by the practicing dentists may be due to the fear of failure and to avoid possible failure they prefer to perform RCT over DPC. The success rate of DPC has been increased due to the recent understanding on pulp pathology that when pulp has been exposed, the necrosis and local inflammation of adjacent tissue takes place but the remaining pulp is intact. In fact, the success of a DPC depends on tooth condition, appropriate isolation needed and the expertise of the dentist. The results of the present study are supported by that of Rawalpindi⁽²⁵⁾ study as majority of the participants regardless of their work experience and post-graduation preferred CH over the rest of the materials for DPC.

In private sector, first treatment option and a combination of CH, GIC, adhesive and composite for indirect capping was opted significantly more than public sector ($p=0.03$ and $p=0.02$ respectively), whereas, for direct capping CH was opted significantly more in public than private ($p=0.01$). The reason behind the selection of CH by public sector may be cost-effectiveness.

CONCLUSION

Within the limitations of this study, following conclusion may be drawn;

- The preferred treatment choice for deep carious lesions was to remove total caries and restore temporarily in first visit then restore permanently in second visit.
- For dental pulp capping, the material of choice was CH. In public sector CH was also significantly more preferred than private.
- In case of deep cavities, the GIC in combination with CH and was material of choice for lining under composite resin.
- The work experience and post-graduation of dentists had no significant influence on their selection of treatment option or material used for direct pulp capping.

Conflict of interest: None declared

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