

Endodontic specialists and general dentists perceptions of single and multiple visit root canal treatment: A survey in India

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Abstract

Introduction: The single-visit versus multiple-visit endodontic treatment, one of the main discussions in Endodontics, is about the amount of sessions required to complete an appropriate treatment. There are very different philosophies related to this matter. The aims of this study was to investigate the Endodontists’ point of view regarding single and multiple visit root canal treatment, find out the basis on which the choice is made and how the information required for the choice is acquired.

Methods: A questionnaire dealing with current endodontic practice was prepared. An anonymous questionnaire was mailed to all registered endodontists and GDPs in India to explore their preference and reasons for choosing single-visit or multiple-visit endodontic

treatment for their patients. Information on the variation, limitation and the number of years they have been in dental practice was also collected.

Results: In this survey 35.7% endodontists and 64.3% general dentists participated, with maximum participants having experience of 0-10 years The most common reasons to perform single visit treatment in both groups were: decreased chance of microbial contamination (GDPs 59.7% & endodontists 72.5%) and better recalled root canal morphology in the same visit (GDPs 70.8% & endodontists 62.5%). Most common reasons for doing multiple visit RCT by both groups were positive effects of intracanal medication (GDPs 83.3%, endodontists 90%) and allowing time for resolution of symptoms before obturation (GDPs 83.3% & endodontists 82.5%). Most of GDPs (91.7%) and endodontists (87.5%) preferred

multiple visits in acute apical abscess & endo-perio lesion. In chronic apical abscess only 22.5% of endodontists and 8.3% GDPs performed single visit RCT, however there was a significant difference between the two.

Conclusion: It can be concluded that Indian endodontists and GDPs prefer multiple visit over single visit root canal treatment.

Keywords: Endodontics, GDPs, Multiple-visit, Single-visit, India

Introduction

Endodontic treatment, or root canal treatment, entails the removal of the dental pulp and subsequent cleaning, shaping and obturation of the root canals of a tooth¹. Traditional endodontic (root canal) treatment used to take multiple visits to complete, with one of the main reasons for this being the duration of time required to complete the treatment². Multiple-visit root canal treatment is well accepted as a safe and common therapy³. In addition, the use of contemporary endodontics techniques and equipment such as magnifying devices, electronic apex locators, engine-driven rotary nickel titanium files and so forth not only increases the success rate of endodontic treatment but also shortens the time needed for the treatment. Endodontic treatment may therefore be completed in a single visit³. Single -visit endodontic therapy has many advantages e.g.

- (a) it reduces the number of patient appointments;
- (b) it eliminates the chance for interappointment microbial contamination;
- (c) it allows for the immediate use of the canal space for retention of a post.

There are, however, a few disadvantages to single-appointment endodontic therapy, and the extent of the practice of one-appointment endodontics and the incidence of flare-ups differ from one report to another⁴. Single visit root canal treatment versus the multiple visit

root canal treatment has been the subject of a long standing debate within the dental community⁵. Some of the unresolved issues include differences in clinical outcomes, inadequate microbial control and pain. The air around the controversy can be investigated more systematically with the aid of an evidence based approach. When the clinicians are faced with choices of which treatment should be offered to patients, the central issues that should be considered are effectiveness, complications, cost and probably patient /operator satisfaction⁶. However, Ferranti was able to describe how the most important criteria for achieving successful results were, in fact, the proper shaping and cleaning of the canals. Currently, these principles are still applied, as important criteria, prior to consideration of single-visit treatment.

In 1970, Tosti reported a satisfactory result in his clinical study using a single-visit approach, although the sample size of his study was small⁷. A number of reviews have compared single-visit versus multiple-visit root canal treatment. Some of these are outdated, others investigate only short-term pain as outcome, again others build on evidence beyond controlled trials like cohort studies or expert opinions, or pooled short-term and long-term outcomes, which does not allow to weigh them against each other⁸. Sathorn et al. pointed out that an important consideration in treatment decision-making was the human factor. The treatment decision-making is highly dependent on the dentists, and they in general are more influential than any other party in the treatment decision. In many cases they are not likely to offer patients a choice between single- and multiple-visit treatments because their clinical perceptions including treatment philosophy, rationale, and preference for the different treatment options are unavailable to the patients¹.

The aim of the present study were therefore to study the preference for single- and multiple-visit endodontic

treatment by endodontic specialists and general dentists in India, and to investigate their reasons for choosing single- or multiple-visit treatment in their practices.

Methods

Recruitment of participating dentists: This study was conducted from June 2019 to December 2019. The target sample consisted of two groups: endodontists and General dental practitioners. We invited all registered endodontists and GDPs to participate in our questionnaire survey. An invitation mail was first sent in June 2019 with an anonymous self-administered questionnaire attached (Figure 1). The recipients were asked to complete and return the questionnaire by mail. A reminder mail was then sent to all invited clinicians 4 weeks later to increase the return rate of the questionnaire.

Questionnaire design

In order to design the questionnaire, a systematic literature search was performed. Two hundred papers in the English language were screened and 39 clinical trials were included in the review. The common factors influencing the choice of using single- and multiple-visit endodontic treatment were identified. In the questionnaire, we sought

Q.1 Are you currently practicing RCT?

YES

NO

Q.2 How long have you been practicing RCT?

0 - 5 years

5 - 10 years

10 - 15 years

More than 20 years

Q.3 Which form of RCT do you generally perform?

Only single visit rct

Only multiple visit rct

Predominantly single visit rct

Predominantly multiple visit rct

Both single-visit and multiple visit rct equally

information on clinicians' perception of single- and multiple- visit endodontic treatment via a total of 11 closed questions fitted on one page. The questionnaire was piloted on 10 private general dental practitioners and a professor specializing in endodontics; feedback was collected and amendments were made accordingly before the main study. The final questionnaire contained a list of identified common factors that might influence the decision for choosing a single- or multiple-visit endodontic treatment, such as patient preference and high success rate. The participants were asked to indicate their degree of agreement with the statements on a three-point Likert scale (agree; neutral; disagree). Other questions, such as number of years of clinical dental practice, and preference for, and frequency of, single-visit and multiple-visit endodontic treatment, were also asked.

Endodontist Perception of Single-visit and Multiple-visit Root Canal Treatment in India. (This survey aims to investigate the current practice of root canal treatment. There is no right or wrong answer to the question below so please choose the answer that represents your opinion.)

Depends on case to case

Q.4 In the below mentioned endodontic conditions which type of endodontic therapy would you prefer?

- Symptomatic apical periodontitis
- Acute apical abscess
- Chronic apical abscess
- Hot tooth
- Endo-perio. Lesion
- Intentional RCT

Q.5 In case of Anatomical variation or limited access what would you prefer?

- Single - visit RCT
- Multiple - visit RCT

Q.6 Why would you prefer multiple-visit over single-visit?

	Agree	Neutral	Disagree
A. Lengthy treatment can be shortened into multiple appointments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Tooth with poor prognosis can be assessed during the treatment process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Positive Effects of intracanal medication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Allow time for over the appointment resolutions in symptoms before obturation (e.g. Pain, abscess)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Better success rate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. Dentist's preference/favorable previous experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. Patient's preference/favorable previous Experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q.7 Which factor above in Q 6 would you consider the most Important for you to do multiple- visit RCT?

.....

Q.8 What factors would you consider for single -visit RCT?

	Agree	Neutral	Disagree
A. Root canal morphology is better recalled within same visit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Decreased chance of microbial contamination of canal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Decreased risk and complication of local anesthesia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- D. Better prognosis rate
- E. Decreased chances of Procedural errors
- F. Dentist's preference/favorable previous experience
- G. Patient's preference/favorable previous experience
- H. Less material wastage

Q.9 Which factor above in Q 8 would you consider the most Important for you to do single- visit RCT?

Q.10 In your practice in which modality you have come across higher incidence of postoperative pain and swelling?

- Single - visit rct
- Multiple - visit rct

Q.11 which is the most common reason for the clinician to avoid single visit RCT?

- Fear of post-op pain.
- Fear of flare ups.
- Fear of failure.
- Lack of time.
- Fear of being "unconventional". (Community of practice)
- Fear of patient not accepting single visit Endodontics.
- Not economically viable.
- Physically demanding for dentist

Statistical Analysis

The data collected were entered into a personal computer and analyzed with the software IBM SPSS Statistics 20.0 (Armonk, NY, USA). Chi-square tests were used to evaluate the differences in preference of the dentists for single-visit endodontic treatment. The level of statistical significance was considered at $p\text{-value} \leq 0.05$.

Results

In this survey 35.7% endodontists and 64.3% general dentists participated, with maximum participants having experience of 0-10 years. Surprisingly, most of the GDPs and endodontists have come across higher incidence of failure in single visit RCT due to post-operative pain and swelling, still they did not consider it as an important criteria for the selection of treatment. Fear of failure was

the most common reason for GDPs to not perform single visit RCT whereas endodontists felt that it was their lack of time not to perform single visit treatment (Table 1). The preference of single visit endodontics among both groups was highest in cases of intentional RCT (Table 2). The most common reasons to perform single visit treatment in both groups were: decreased chance of microbial contamination (GDPs 59.7% & endodontists 72.5%) and better recalled root canal morphology in the same visit (GDPs 70.8% & endodontists 62.5%) (Figure 2). Better success rate was not an important factor for endodontists in choosing the type of treatment, as compared to GDPs. This reveals a more confident approach with better techniques by the endodontists helping them achieve better results irrespective of the treatment modalities

employed. Most common reasons for doing multiple visit RCT by both groups were positive effects of intracanal medication (GDPs 83.3% & endodontists 90%) and allowing time for resolution of symptoms before obturation (GDPs 83.3% & endodontists 82.5%). Most of GDPs (91.7%) and endodontists (87.5%) preferred multiple-visit in acute apical abscess & endo-perio lesion (Figure 1). In chronic apical abscess only 22.5% of endodontists and 8.3% GDPs performed single visit RCT, however there was a significant difference between the two groups which might be due to lack of higher knowledge in the concerned field and calls for a continual educational promotion among the GDPs. GDPs & endodontists preferred multiple visit treatment in cases of hot tooth. Although with adequate supplemental anesthesia, this condition can be handled efficiently with single visit treatment. More than 50% dentist believe that more material wastage occurred in multiple visit RCT and thus it's a factor to be consider in selection of the treatment.

Discussion

The aim of the present study was to investigate the endodontists' point of view regarding to single and multiple visit root canal treatment⁵. Questionnaire-based studies are practical and allow information gathering from a large number of people in a short span of time and in a relatively cost-effective manner. In addition, questionnaires can be carried out by any number of people with limited effect on the study's validity and reliability. In this study, two groups endodontic specialists and general dentists in India were distributed the questionnaires either personally or through E-mail and we administered a survey to a random sample of 500 dentists selected from the large number of registered dentists in india^{9,2}. In this survey the response rate was 35.7% endodontists and 64.3% general dentists.

To encourage a good response rate in this study, a simple one-page closed-end questionnaire was used. A systematic literature search was performed to extract reasons for the clinicians to perform single- or multiple-visit endodontic treatment and these reasons were incorporated in the questionnaire. Furthermore, the questionnaire was pilot tested, feedback obtained, and amendments made accordingly before the main study. A simple three-point scale (agree; neutral; disagree) was used to make it easy for the participants to choose their answers. The simple design and easy-to-answer format could be one of the main reasons that no questionnaire was rejected because of missing data or inappropriate answers². It is also mentioned that sending a reminder increased their response rate¹⁰. In this study, both GDPs and endodontists in India preferred multiple-visit endodontic treatment. The majority of the GDPs and endodontists expressed the view that neither single-visit treatment nor multiple-visit treatment would yield a higher success rate over the other².

In this study, both GDPs and endodontists in India preferred multiple-visit endodontic treatment. Although the training backgrounds in different countries vary, this finding, that most clinicians practiced multiple-visit endodontic treatment on their patients is consistent with what has been reported in studies conducted in Australia,1 Belgium, 7 Denmark,12 Japan,6 and the United States². In 2012, a study conducted at the University of Iowa documented that 78% of 124 patients preferred single-visit RCTs, yet many would favor multiple visits if the success rate of multiple visits were higher than that of a single-visit⁹.

According to survey done in 2014 Brazil gave the result stating need for single or multiple visits mainly depends upon tooth vitality, and the success rate of both is comparable². The success and failure of endodontic

treatment are determined by long-term results and not the presence or absence of short-term postoperative pain¹¹. Surprisingly, most of the GDPs and endodontists have come across higher incidence of failure in single visit RCT due to post operative pain and swelling, still they did not consider it as an important criteria for the selection of treatment. Postoperative pain and swelling at the mild level is common in root canal treatment which may be the result of over-instrumentation, over-filling, passage of medicine or infected debris into the periapical tissues, damage of the vital neural or pulp tissues or central sensitization. The preponderance of the research to date has shown no significant difference in postoperative pain has been found when one-visit RCT was compared with two-visit treatment, especially in teeth with vital pulps¹².

The GDPs most common reason was fear of failure not to perform single visit RCT whereas endodontists felt that it was their lack of time not to perform single visit treatment. Risk of flare-up and failure was significantly higher after single visit than multiple-visit treatment because of more post-operative complication in single visit treatment⁸. This survey also found that less experienced GDPs preferred multiple-visit treatment. A further study could be carried out to explore whether this might be due to their level of competence or lack of experience in endodontic treatment².

According to this survey the preference of single visit endodontics among both groups was highest in cases of intentional RCT. In the late 1970's and early 1980's, progressive endodontists accepted single visit treatment of vital cases because those canals were uninfected and therefore unlikely to undergo an infectious flare up afterwards⁶. Although single visit treatment was not performed by most of the endodontists, the treatment of necrotic teeth with periapical lesion has been done successfully by many authors who justify the results by

the elimination of bacterial contamination in the root canal through adequate instrumentation, irrigation and filling. Despite the large refusal, the treatment of teeth with pulp necrosis, with or without periapical lesion, has been successfully established and approved by many authors. Field et al. retrospectively assessed the success rate of single visit root canal therapy. Both vital and necrotic cases, as well as those with and without peri-radicular disease were included⁵.

We found in study the two commonest reasons for choosing single-visit treatment by both endodontists and GDPs were: decreased chance of microbial contamination (GDPs 59.7% & endodontists 72.5%) because of the tooth may also be susceptible to reinfection through the temporary filling and dressing during the interim period in case of multiple visits because of microleakage¹ and better recalled root canal morphology in the same visit (GDPs 70.8% & endodontists 62.5%). One of the reasons why endodontists and GDPs perform single-visit treatment is that single-visit treatment enables better recall of root-canal morphology. This not only enhances the efficacy of the root-canal treatment by reducing the treatment time but also minimizes the risk of instrument separation (breakage). Instrument separation is not uncommonly found among dentists who are not aware about the anatomy of the root-canal system or the tooth has possibly been modified by dental caries or other conditions such as trauma or erosion².

Better success rate was not an important factor for endodontists in choosing the type of treatment, as compared to GDPs. This reveals a more confident approach with better techniques by the endodontists helping them achieve better results irrespective of the treatment modalities employed.

Most common reasons for doing multiple visit RCT by both groups were positive effects of intracanal medication

(GDPs 83.3%, endodontists 90%) and allowing time for resolution of symptoms before obturation (GDPs 83.3% & endodontists 82.5%). The major listed problem not to perform root canal treatment in single visit is the importance of using an intracanal medication to promote a better disinfection process. The most reported intracanal medication was calcium hydroxide for the time of seven days. Several studies highlighted the benefits of the use of intracanal medication during endodontic therapy. Trope demonstrated that the use of intracanal medication with calcium hydroxide can improve healing when compared to single visit therapy⁵.

In addition to killing bacteria, calcium hydroxide has ability to hydrolyse the lipid moiety of bacterial lipopolysaccharide (LPS), thereby inactivating the biologic activity of lipopolysaccharide (LPS) and reducing its effect. This is very desirable effect because dead cell wall material remains after the bacteria have been killed and can continue to stimulate inflammatory response in the peri-radicular tissue¹³.

According to a study the dentists may prefer to wait till the complete subsidence of pain and other symptoms before obturating the canal system. Another possible explanation could be that the initial visit was spent for treating the pain and acute symptoms¹⁴. They concluded that their findings emphasize the importance of completely eliminating bacteria from the root canal system before obturation otherwise there are chances of re-infection in the canal¹⁵. They add that this objective cannot be reliably achieved in a one-visit treatment because it is not possible to eradicate all infection from the root canal without the support of an inter-appointment antimicrobial dressing.

In teeth with necrotic pulp and apical periodontitis, with the complex anatomy of teeth and root canals creates an environment that is a challenge to the complete cleansing

in single visit therefore the multiple appointment procedure is may be more effective to achieve more bacteria free canals.

So according to this study, most of GDPs (91.7%) and endodontists (87.5%) preferred multiple visit in acute apical abscess & endo-perio lesions. An interim dressing of an iodine–calcium hydroxide combination is effective against *Enterococcus faecalis*, an organism commonly found in failed cases¹⁶. Symptomatic teeth can also be managed by single visit after controlling the abscess infection with antibiotic, provided the root canal is dry without any discharge¹⁷. In chronic apical abscess only 22.5% of endodontists and 8.3% GDPs performed single visit RCT, however there was a significant difference between the two groups which might be due to lack of higher knowledge and practice in the concerned field and calls for a continual educational promotion among the GDPs. GDPs & endodontists preferred multiple visit treatment in cases of hot tooth. Although with adequate supplemental anesthesia, this condition can be handled efficiently with single visit treatment.

In this study, there was lack of information to explain why in individual cases decisions were taken on single- or multiple-visit endodontic treatment. Yap et al. recently reported that single-visit root canal treatments could be needed for special-needs patients to help them retain their dentition¹⁸. This could be a valid reason to implement single- visit treatment and further studies could be carried out to investigate the criteria for performing single- versus multiple-visit endodontic treatment.

Conclusion

The study concluded that most Indian endodontists and GDPs preferred offering multiple-visit endodontic treatment. The commonest reasons for choosing multiple-visit treatment for endodontists and GDPs alike were the positive effects of interappointment medications and that

the tooth to be treated had doubtful prognosis. The commonest reasons for choosing single-visit treatment for both endodontists and general dentists was the same – decreased chance of microbial contamination and that treatment can be completed in one visit.

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Legend Table and Figures

Table 1: Comparison most common reason for the clinician to avoid single visit RCT between the two groups

Factor	Qualification		χ^2	p- value
	BDS	MDS		
Fear of post-op pain.	20.8%	10.0%	10.419	0.166
Fear of flare ups.	16.7%	25.0%		
Fear of failure.	34.7%	22.5%		
Lack of time.	9.7%	27.5%		
Fear of being “unconventional”. (Community of practice)	1.4%	2.5%		
Fear of patient not accepting single visit Endodontics.	5.6%	7.5%		
Not economically viable.	5.6%	2.5%		
Physically demanding for dentist	5.6%	2.5%		

Chi square test, p-value ≤ 0.05 considered as significant

Table 2: Comparison of preferred type of endodontic therapy for different endodontic conditions between the two groups

Endodontic conditions	Endodontic therapy	Qualification		χ^2	p- value
		BDS	MDS		
Symptomatic apical periodontitis	Single visit	26.4%	35.0%	0.917	0.228
	Multiple visit	73.6%	65.0%		
Acute apical abscess	Single visit	8.3%	12.5%	0.504	0.345
	Multiple visit	91.7%	87.5%		
Chronic apical abscess	Single visit	8.3%	22.5%	4.449	0.037
	Multiple visit	91.7%	77.5%		
Hot tooth	Single visit	22.2%	27.5%	0.391	0.343
	Multiple visit	77.8%	72.5%		
Endo-perio lesion	Single visit	8.3%	12.5%	0.504	0.345
	Multiple visit	91.7%	87.5%		
Intentional RCT	Single visit	68.1%	90.0%	6.768	0.007
	Multiple visit	31.9%	10.0%		
Anatomical variation or limited access	Single visit	26.4%	25.0%	0.026	0.530
	Multiple visit	73.6%	75.0%		

Chi square test, p-value ≤ 0.05 considered as significant

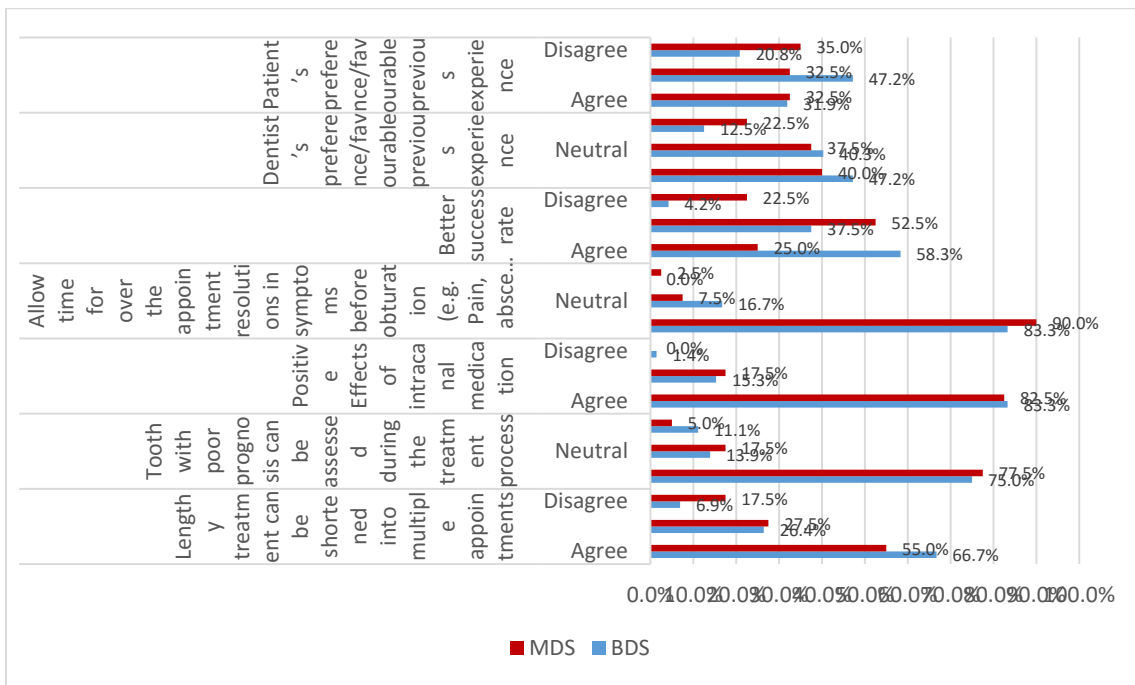


Figure 1: Comparison of preference of multiple - visit RCT between the two groups

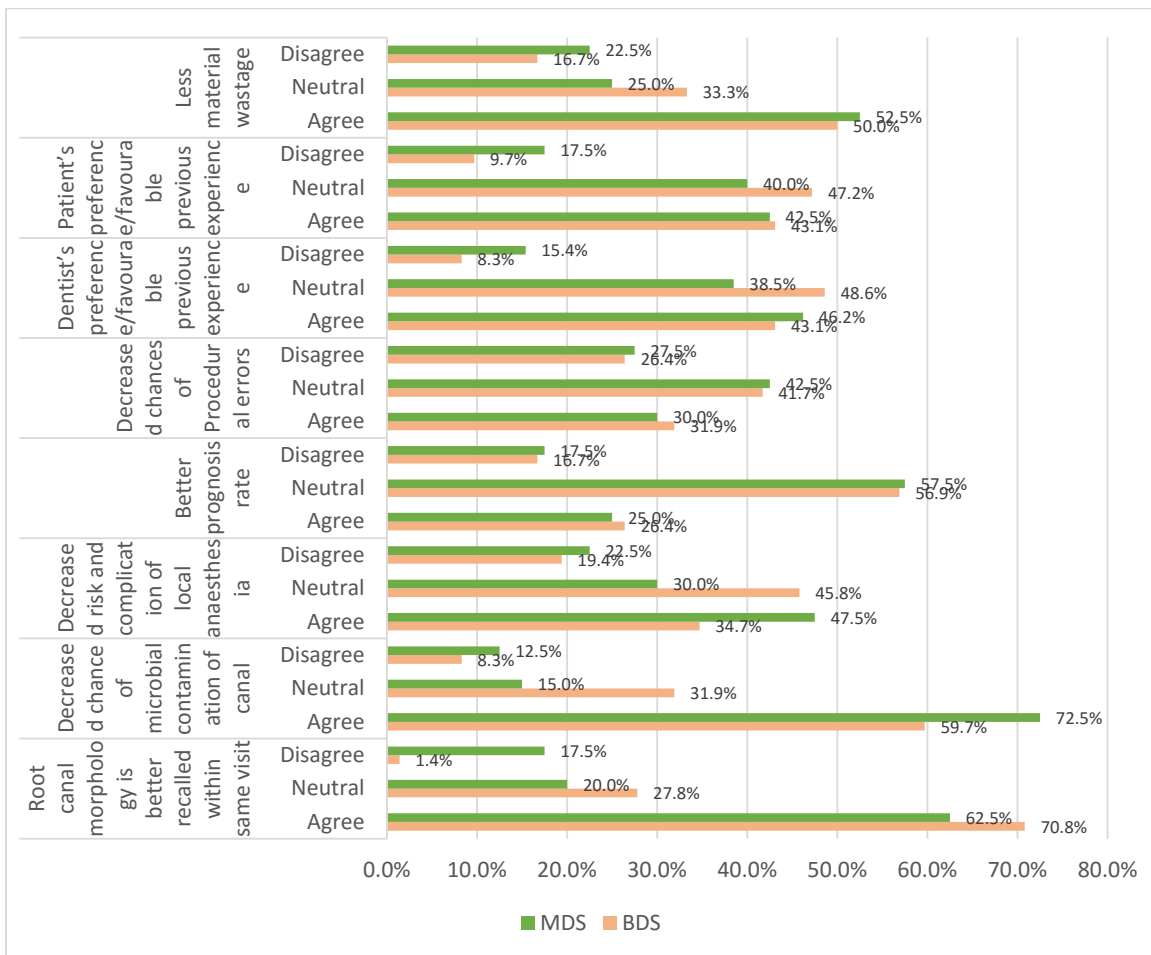


Figure 2: Comparison of preference of single - visit RCT between the two groups