

EXtraction or PREServation? EXPRESS survey of patients' preference for toothache in public health facilities of Eastern India

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Objective: To investigate patients' preference for extraction or preservation for toothache and hypothetical anterior tooth pain along with the specific reason for their choice. **Basic research design:** Cross-sectional analytical semi-structured interview study. **Participants:** A sample of 703 adult dental outpatients visiting secondary and tertiary government health centres with toothache due to dental caries in Eastern India. **Main outcome measures:** Patients preferring restorative or extraction services for toothache, specific reason, and socio-demographic background factors for anterior and posterior teeth. **Results:** Half (50.1%) choose preservation for present toothache and 79.9% for hypothetical front tooth pain. Immediate relief from toothache for extraction and the motive to preserve natural teeth for preservation were the main reasons expressed. In logistic regression, participants preferring extraction were more likely to be aged 25-34 years (OR = 1.94), 55+ years (OR=33.32), have primary and below education level (OR=1.99), have had a previous extraction (OR=1.99) and be unaware of preservation options (OR=2.34). For assumed anterior tooth pain, those between 25-34 years (OR=0.39) were more likely to choose preservation. Participants with primary and below education levels (OR=1.99) and unaware of preservation options (OR=1.95) chose extraction of the front tooth irrespective of their choice of treatment for the present toothache. **Conclusion:** Notable differences between the choices to preserve or extract a posterior tooth were not found. There was greater preference towards preserving anterior teeth. Future research should identify additional barriers to the preference and utilization of restorative services.

Keywords: India, dental pain, developing countries, exodontia, filling, patient request

Introduction

Toothache is a global health problem affecting the performance of daily activities, school attendance, care-seeking behaviours, and quality of life. Evidence from some high and middle-income countries suggests an increasing trend in prevalence and dental visits due to toothache in recent decades (Raittio *et al.*, 2020). A recent systematic review concluded that nearly 35% of Indian adults had complete or partial tooth loss, with dental caries being the leading reason (Venkat *et al.*, 2021). An exploratory survey among Nigerian adults documented that patient preference was one reason for tooth extraction and relief from toothache was observed to be the main motive (Osaghae *et al.*, 2016). The request for extraction because patients considered it a cheaper treatment option has also been stated (Uti and Sofola, 2009). In some cases, patients request tooth extraction for psychological reasons, which include fear of dental treatment or somatoform pain disorder (Broers *et al.*, 2010).

Patients' preferences concerning dental treatment, can be made based on the treating clinician's opinion (Bencke *et al.*, 2020). Patients' participation during dental consultations may also be influenced by their perceived need for oral health (Gilmore *et al.*, 2006). Additionally; the treatment settings, cultural factors, accessibility and availability of care, cost of care and the dentist-patient relationship may influence patients' decisions (Patrick

et al., 2006). Studies of patients' treatment choices and their willingness to pay (WTP) to preserve or extract teeth have shown varying findings under private and public study settings in other countries. (Mittal *et al.*, 2022; Nyamuryekung'e *et al.*, 2018).

The oral health care system of the public sector in India, operates at primary, secondary and tertiary levels, with the common goal being the attainment of disease-free oral cavities among the people of the country, irrespective of the ability to pay for care, free of cost. At the primary level, Health and Wellness Centres deliver basic oral health care including prompt referral to appropriate health facilities by community healthcare workers. At the secondary level, services like minor oral surgical procedures are delivered through Community Health Centres (CHCs) and District Hospitals (DHs) by dental surgeons. Oral health services that include complex restorative and prosthetic procedures are delivered at the tertiary level through dental colleges by specialist dental surgeons (NOHP, India, 2023).

The preference for extraction or preservation among patients with toothache due to dental caries in low- and middle-income countries (LMIC) where services are provided free of cost remains largely unexplored. Baseline data are essential to identify where efforts can be directed to increase the level of restorative care in India. This study aimed to determine preferences for treatment for posterior and hypothetical anterior tooth pain and

associated factors among patients visiting secondary and tertiary level government health facilities with toothache in Eastern India. As a secondary objective, the reason for deferring attendance to the dental facilities was assessed among patients reporting after more than two weeks of toothache onset.

Method

Data were collected at the government secondary and tertiary health centres in the Eastern state of Odisha, India between March 2022 to January 2023. The hospital at Cuttack is a government tertiary care centre with patients visiting from all the regions of the state. The other three secondary-level public health centres were in the CHCs and DHs at Bentkar, Khordha and Boudh representing the central and southern zones of the state. These four centres were selected to ensure adequate representativeness based on steady patient flow from nearby semi-urban and rural regions. The average number of patients attending the dental outpatient department (OPD) per day was 100-120 and 8-10 in the tertiary and secondary level centres respectively. Convenience sampling was employed and the sample size calculation used the OpenEpi online software (www.OpenEpi.com). A survey at government centres in Malaysia found 59% of participants chose preservation (Razak *et al.*, 1990). Therefore, considering a 99% confidence limit, an alpha level of 5%, a total of 642 patients and thus about 320 from each healthcare level was deemed sufficient. Patients aged 18 years or older, with the chief complaint of toothache due to dental caries, were included in the study. Participants with pain from causes other than carious teeth (mouth ulcers, fractured or mobile teeth) or with impacted third molars or pericoronitis were excluded.

The study protocol was approved by the Institutional Ethics Committee, S.C.B Dental College & Hospital, Cuttack, Odisha (IEC/SCBDCH/125/2021). Permission to conduct the study was obtained from the regional administrative officers at the centres and from the dental medical officers in charge of the dental units. The purpose of the study was described and a patient information sheet was provided to potential participants. Subsequently, written informed consent was obtained. Participation was voluntary without any incentives and confidentiality was assured.

A 15-item data collection tool was developed by the investigators and the scenario was tested on a sample of 50 dental outpatients who reported to the OPD at the tertiary centre with toothache. To assess comprehensiveness and face validity, participants were asked about difficulties in understanding items in the questionnaire. As none of the participants elicited any untoward previous dental treatment experience, the question was removed. The interview guide was further evaluated by a group of researchers and experts in the field of public health dentistry for content validity. The team made suggestions regarding (i) the adequacy of the domains selected for assessing the patients' treatment preferences and the underlying reason; (ii) the compatibility of the items to the reality of the services offered at the public health centres; (iii) clear language and appropriate terminology. The results of the pilot study informed the final interview

guide but were not included in the data analysis. The final semi-structured interview guide comprised thirteen items in three domains of participants' sociodemographic details (gender, age, education level, and average monthly household income); previous dental visits if any and the reason for reporting late if applicable. Questions enquired about previous treatment and awareness of tooth preservation options. The last domain related to the treatment choice namely: extraction or preservation by restorative procedures for the present dental problem. Participants were then asked a hypothetical question about their treatment preference if they had the same problem in their front teeth. Open-ended questions included reasons for the choice of treatment and late attendance to the dentist whenever appropriate.

Clinical examinations using a mouth mirror, probe, and adequate illumination determined if the affected tooth could be restored or required extraction. Patients were then asked about their treatment preference before the dentist's judgement was disclosed. All four dentists at each centre were trained and calibrated for data collection and clinical examinations, by an experienced examiner in two separate sessions of two hours each at the tertiary dental hospital. Grossly decayed carious tooth with severe crown destruction, grade 3 mobile tooth due to combined endo-perio lesions were indicated for extraction. The intra-examiner and inter-examiner reliability was assessed using Cohen's kappa (k coefficient 0.86 and 0.77 respectively).

Frequency distributions for age, education and monthly household incomes were transformed for analysis. Age was categorised into four groups in years (18-24, 25-34, 35-44 and 45-54 and 55+). Education was categorised as primary and below, secondary or graduation and above. Monthly household income was categorized into five categories (INR 10,000 and below, INR 10,001-29,972 and INR \geq 29,973-49961, INR 49962-74755 and more than INR 74,755). The tooth status as assessed by the examiner was regarded as preservable or indicated for extraction. Previous dental treatment received was characterized by tooth removal, filling, both, and none. Reasons elicited for choice of treatment and late dental attendance were noted.

Data were entered into SPSS Windows, Version 23 (IBM Corp., Armonk, NY, USA). After descriptive statistics were computed differences in proportions were compared using chi-square tests. Multivariable logistic regression models were used to determine associations between independent variables and the preference of treatment for present toothache and hypothetical anterior tooth pain. Independent variables that were associated with the dependent variable in bivariate analyses were retained in subsequent models. Interactions were assessed during the final process and multicollinearity between the independent variables was not detected. A value of $p < 0.05$ was used as the threshold for significance.

Results

A total of 715 patients were eligible, of whom 12 declined to participate, giving a response rate of 98.3% and leaving 703 participants for analysis. The gender distribution of the participants was almost even. Half

(50.1%) chose preservation for present toothache and 79.9% for hypothetical front tooth pain. About 86.1% of the affected teeth were preservable as assessed by the examiners. (Table 1)

Table 1. Characteristics of 703 patients visiting public health facilities in Eastern India.

	%
Gender	
Male	46.5
Female	53.5
Age (years)	
18-24	15.8
25-34	29.0
35-44	23.5
45-54	20.9
55+	10.8
Centre	
Tertiary	48.4
Secondary	51.6
Monthly household income (INR)	
<=10001	20.6
10002-29972	57.9
29973-49961	14.1
49962-74755	5.4
>74755	2.0
Education	
Primary and below	47.6
Secondary	35.3
Graduation and above	17.1
Previous treatment received	
Tooth removal	30
Filling	8.7
Both	8.3
None	53
Aware of tooth preservation options	
Yes	60.2
No	39.8
Tooth status	
Indicated for extraction	86.1
Preservable	13.9
Tooth type	
Anterior	4.8
Posterior	95.2
Preference for treatment for current toothache	
Preservation	50.1
Extraction	49.9
Preference of treatment for hypothetical anterior toothache	
Preservation	79.9
Extraction	20.1

Table 2 shows that treatment preference was associated with age groups, centres, education level, previous tooth removal and awareness of preservation options in bivariate analyses. For hypothetical anterior toothache, age group, education level, awareness of tooth preservation options and choice of treatment for the present toothache were associated with treatment preference. In multiple regression models (Table 3) participants aged 25-34 years or more than 55+ years, having primary or lower education level, those who had lost a tooth or who were not aware of preservation options were more likely to prefer extraction than their counterparts, irrespective of the centres. In the case of a similar problem in anterior teeth, those between 25-34 years were more likely to prefer preservation than other age groups. Participants with primary or lower education levels or who were unaware of preservation options chose extraction of the front tooth irrespective of their choice of treatment for the present toothache. These models predicted appreciable proportions of variance in preference for treatment. (Adjusted R² = 0.29 and 0.48 respectively).

Among those who preferred to preserve their tooth, the reasons included: *proper chewing (12%), preserve natural teeth (32%), and already lost teeth (6%)*. For those who preferred extraction; the reasons were *immediate pain relief (28%), restorations not effective (7%), negative opinions of others about restorative procedures (1%), multiple appointments are bothersome (8%) and teeth not required in old age (6%)*. Nearly 65% of the participants had experienced pain for two weeks or more. Having *tried self-medication* was the chief reason for the patient's late dental visit followed by *dependent on others for conveyance*. The other reasons included *fear of dental treatment, financial constraints for travel and, time constraints*. (Table 4)

Discussion

This study aimed to determine the willingness to preserve natural teeth versus extraction for toothache among patients visiting government health centres in Odisha, Eastern India. There were similar levels of preference for the two treatment options for their presenting condition. However, it is encouraging to note that, more than three-quarters of the outpatients would favour the preservation of a front tooth. These findings contrast with a Malaysian study and the differences may be due to the presence of a multiracial population in that survey (Razak *et al.*, 1990). Recently, a WTP analysis in Iran reported that over 65% of participants favoured tooth preservation over extraction (Ghahramani *et al.*, 2022). This discrepancy could be because the sample only included people who did not have toothache. However, compatible with the findings of the present study, WTP for anterior tooth therapy was greater than for posterior teeth in Iran, indicating that dental appearance was important to participants.

Immediate pain relief was the most common reason for extraction, followed by the belief that *restorations are not effective* and *multiple appointments are bothersome*. Additionally, the assumption that *teeth are not required in old age* and the *negative opinion of others about restorative procedures* was mentioned by some participants. Among the other half of patients who wanted to save

Table 2. Factors associated with treatment preference for current toothache and hypothetical anterior toothache among 703 dental patients.

Variable	Current toothache		p (Chi-sq.)	Hypothetical anterior toothache		p (Chi sq.)
	Preservation n=352 (%)	Extraction n=351 (%)		Preservation n=562 (%)	Extraction n=141 (%)	
Gender						
Male	46.3	46.7	0.91	48.0	40.4	0.15
Female	53.7	53.3		52.0	59.6	
Age group (in years)						
18-24	19.6	11.9	<0.01	16.5	12.7	<0.01
25-34	28.6	29.4		29.0	29.1	
35-44	28.4	18.5		24.7	17.9	
45-54	22.7	19.1		23.1	13.4	
55+	0.7	21.1		6.7	26.9	
Centre						
Tertiary	57.3	39.3	<0.01	47.7	49.6	0.47
Secondary	42.7	60.7		52.3	50.4	
Monthly household income (INR)						
<=10001	18.4	22.7	0.64	19.5	24.8	0.21
10002-29972	58.5	57.2		60.1	48.9	
29973-49961	15.1	13.3		13.3	16.0	
49962-74755	5.9	4.9		5.5	6.5	
>74755	1.9	1.9		1.6	3.8	
Education						
Primary and below	34.9	60.3	<0.01	43.2	65.2	<0.01
Secondary	41.3	29.3		37.1	27.6	
Graduate and above	23.8	10.4		19.7	7.2	
Previous dental visit						
Yes	60.7	62.1	0.72	62.4	57.4	0.37
No	39.3	37.9		37.6	42.6	
Previous treatment						
Tooth removal	19.3	40.7	<0.01	28.1	37.5	0.13
Filling	12.7	4.5		8.8	7.9	
Both	11.7	4.9		8.8	6.9	
None	56.3	49.9		54.3	47.7	
Awareness of tooth preservation options?						
Yes	76.1	44.1	<0.01	63.5	47.8	0.01
No	23.9	55.9		36.5	52.2	
Tooth type						
Anterior	4.8	4.8	0.99	-	-	-
Posterior	95.2	95.2		-	-	
Patient preference for treatment						
Preservation	-	-	-	62.6	1.4	<0.01
Extraction	-	-		37.4	98.6	

their tooth, the proclivity to *preserve natural teeth*, the ideology that teeth are required for *proper chewing* and *already lost teeth* were expressed.

Younger and older adults were more likely to choose extraction for the treatment of toothache. This was in tandem with the study in Nigeria (Osaghae *et al.*, 2016) where authors observed that patients aged 26 years and above requested extractions. Relief from the pain that affected their daily activities and work efficiency among the younger age group, and having to visit

the dentist for multiple appointments for preservation could be the reasons for opting for extraction. Among patients aged over 55 years, the experience of tooth loss and belief that teeth are no longer required in older age was more prevalent. Similar findings were observed by Razak *et al.* (1990) and Jaleel *et al.* (2014). Nevertheless, more participants would retain an anterior tooth than a posterior tooth, especially among young adults aged 25-34 years. This finding was in agreement with research in Toronto, which suggested that the participants might

Table 3. Logistic regression model of predictors of treatment preference for the current toothache and hypothetical anterior toothache among 703 dental patients.

<i>Variable (Reference)</i>	<i>Adjusted OR (current toothache)</i>	<i>95% CI</i>	<i>Adjusted OR (hypothetical anterior toothache)</i>	<i>95% CI</i>
Age group (18-24)				
25-34	1.94	1.17, 3.22	0.39	0.38, 1.63
35-44	1.07	0.63, 1.82	0.83	0.37, 1.81
45-54	1.31	0.75, 2.26	0.79	0.17, 0.92
55+	33.32	7.54, 147.24	1.34	0.62, 2.92
Gender (Male)				
Female	0.93	0.66, 1.31	-	-
Education (Graduation and above)				
Primary and below	1.99	1.18, 3.37	1.99	1.18, 3.33
Secondary	1.34	0.81, 2.23	1.34	0.81, 2.23
Previous treatment (None)				
Tooth removal	1.58	1.06, 2.36	-	-
Filling	0.59	0.31, 1.17	-	-
Both	0.66	0.34, 1.29	-	-
Awareness of tooth preservation options? (Yes)				
No	2.34	1.60, 3.42	1.95	1.17, 3.28
Centre (Tertiary Health Centre)				
Secondary Health Centre	1.01	0.68, 1.47	-	-

Table 4. Reasons for deferring dental attendance among 455 patients.

<i>Reason elicited</i>	<i>Centre</i>	
	<i>Tertiary (n=201) %</i>	<i>Secondary (n=254) %</i>
Fear of dental treatment	3.0	8.3
Tried self-medication	53.2	47.6
Financial constraints for travel	11.4	5.1
Time constraints	9.0	23.3
Dependent on others for conveyance	23.4	15.7

have perceived that a missing posterior tooth impacted less on negative feelings and daily activities than a missing anterior tooth (Azarpazhooh *et al.*, 2013).

Preference to preserve an anterior or posterior tooth was similar across gender groups. Comparable findings were noted in Malaysia, Toronto and Nigeria (Razak *et al.*, 1990; Azarpazhooh *et al.*, 2013; Osaghae *et al.*, 2016). However, a cohort study of risk factors for extractions in Italy found that men were more likely to have a tooth removed (Passarelli *et al.*, 2020). This difference could be due to sampling bias, as only patients having extractions were recruited to that study.

Advanced restorative services such as root canal treatments, crowns and bridges are provided by specialist dental surgeons in tertiary centres, whereas, in secondary centres preventive procedures, and composite filling services are provided by dental officers only when materials are available. Although bivariate analysis showed a trend towards preservation among patients at tertiary health centres, the multivariate analysis indicated that

regardless of the centre, treatment options available did not influence treatment preferences.

Participants with primary or lower levels of education were more likely to choose extraction, as were those who were unaware of preservation options. A similar pattern was seen for front teeth. This prompting factor is echoed in similar studies (Razak *et al.*, 1990; Jaleel *et al.*, 2014), indicating that lack of knowledge and low oral health awareness could be a reason for choosing teeth removal. Initiatives to improve awareness through oral health education and promotion, and emphasizing the importance of maintaining a functional oral cavity from a young age might reduce this behavioural trend over time.

Interestingly, household income did not predict treatment preferences. This contrasted with the preferences of patients attending community dental practices in Toronto where household income was an enabling factor to afford preservation (Azarpazhooh *et al.*, 2013). The influence of income on patients' choices may be restricted within this sample recruited at government treatment centres where treatment is provided at no cost.

Previous tooth removal predicted the preference towards extraction of teeth for the current toothache. This relationship has been observed in other studies (Jaleel *et al.*, 2014; Osaghae *et al.*, 2016). This could be due to the immediate pain relief experienced from previous extractions, the assumption that preservative procedures might not work effectively for toothache or may reflect an underlying tendency among patients. Relatively few patients chose extraction after being influenced by others who experienced faulty and failed restorations. Small proportions of Norwegian patients were also influenced by family, friends, or colleagues to have teeth extracted (Klock *et al.*, 1995).

Most (61.4%) patients had a previous dental visit, of whom half had received treatment in the form of tooth removal and/or restoration. This is an increase compared to a 2011-2022 meta-analysis which concluded that the pooled dental care utilization amongst Indian adults was around 24% (Talukdar *et al.*, 2022). This difference could be because we recruited some participants at tertiary care settings, who would have already attended primary or secondary care.

Despite this high attendance, most patients attended after two weeks of toothache onset. Some reported trying self-medications from local pharmacies for pain relief. Similar findings were observed in Nigeria, where patients visited dental clinics only when in pain (Okunseri *et al.*, 2004). Although meagre in number, the other reasons elicited by patients for the late dental visit were being dependent on others for conveyance, time constraints, financial constraints for travel and fear of dental treatment.

It is encouraging to observe that among those who opted for preservation, typical reasons included saving the natural tooth and for enabling proper chewing. This positive attitude if sustained and reinforced over the general populace can possibly result in a shift towards saving natural teeth. Although not a direct objective of the present study, pharmacists could advise their customers to visit a dentist when supplying over-the-counter painkillers for dental pain.

It should be noted that many of the factors predicting treatment preference and access to care identified in this study map directly onto existing theoretical models of access to care, including the Andersen model, which has already been applied to the dental attendance successfully. Colleagues should adopt this or a similar theoretical perspective to inform the design, analysis, and interpretation of future research (Andersen, 1995; Baker, 2009; Baker and Gibson, 2014).

This is the first multi-centre study conducted at various levels of government healthcare centres to assess patients' preference for treatment. The key strength is the documentation of the reason for the choice of treatment. However, sampling only government centres may have restricted the effect of socio-demographic factors and question order could have influenced patients' treatment preferences. Future studies should use the Andersen behavioural model to inform the design, analysis, and interpretation of research into treatment preferences and other aspects of access.

In conclusion, almost half of the patients attending public dental clinics in Eastern India preferred extractions despite the availability of cost-free restorative treatment. The main motive for choosing the removal of the tooth was pain relief. In addition, most patients visited late to the dentist, after having tried self-medication for toothache. Therefore, informing the populace about early dental visits and the importance of saving their teeth is a pressing priority to be considered by oral health policymakers. Similar studies are needed in various parts of the country and in other LMICs to substantiate the findings and identify additional barriers to the preference and utilization of restorative services.

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