

# Evaluation of the Awareness and Knowledge of Orthodontic Treatment in Purvanchal Region (Uttar Pradesh): A Questionnaire-based Cross-sectional Study

NEELAM MITTAL<sup>1</sup>, ASHISH AGRAWAL<sup>2</sup>, TEJ BALI SINGH<sup>3</sup>, ANKITA SINGH<sup>4</sup>, MANAMI DAS<sup>5</sup>



## ABSTRACT

**Introduction:** Individuals who did not have the opportunity to undergo orthodontic treatment due to lack of information or financial resources, find themselves physiologically deprived of aesthetics. So, awareness must be a part of planning oral health problems in every stratum of the society.

**Aim:** To evaluate the awareness and knowledge of Orthodontic treatment among patients from Purvanchal region, Uttar Pradesh.

**Materials and Methods:** This self-designed questionnaire-based descriptive and cross-sectional study, was conducted from May 2018 to June 2019 at Faculty of Dental Sciences, Unit of Orthodontics, Banaras Hindu University, Uttar Pradesh, India. Four subject expert and one public health dentist formulated 22 bilingual questions. A pilot study was conducted on 200 randomly selected study participants and the internal consistency of the questions were measured statistically (Coefficient of variation ratios, Cronbach's alpha=0.659, Lawshe's index=0.626). The study sample size was then computed using nMaster 1.0 software to be 1748 which was later increased to 2112. Patients were randomly selected and categorised depending on age groups (10-15, 16-20,

21-25, 26-30 years), sex (male/female) and residential area (rural/urban). The questionnaire was distributed among the study group and response were collected on the same day. The data acquired was later subjected to statistical analysis. Chi-square, t-test and Analysis of Variance (ANOVA) were carried out using Statistical Package for the Social Sciences (SPSS) version 20.0 (p-value <0.001).

**Results:** Of the total samples (N=2112), 1316 were males, 82.2% were from urban locations. Overall awareness in the study was found to be maximum for 16-20 years (25%) and minimum for 26-30 years 2.6%. Males were more cautious about their treatment needs (Awareness was 21.3% in male, 12.4% in female). Response to importance of teeth alignment for better facial appearance based on gender and residence was found to be highly significant (p<0.001).

**Conclusion:** There was a sudden decline in dental knowledge about orthodontics after 26 years of age with the maximum awareness in age group 16-20 years. Urban males were more conscious of orthodontic treatment.

**Keywords:** Aesthetics, Appearance, Orthodontist, Rural, Urban

## INTRODUCTION

A balanced face is the outcome of intricate proportions. This maintains equilibrium between the hard tissues (skeleton and dentoalveolar structures) and the soft tissues. To date smile is considered one of the most effective tools for influencing people and with growing awareness of aesthetics, most of the patients reporting for treatment in clinical practice or orthodontic specialty are concerned for their appearance. The prevalence of malocclusion is related to knowledge, attitude, and oral hygiene. It has been found to vary in different countries, ranging from 20 to 43% in India [1,2] from 20 to 35% in the United States [3], 62.4% in Saudi Arabia [4], 88.1% in Colombia [5] and Nigeria [6,7] had a prevalence of 87.7% reported among children. However, abnormal occlusion is commonly overlooked as it is not associated with pain.

Awareness is the state or quality of being conscious of something. Wedrychowska-Szulc B and Syryńska M, and Kerosuo H et al., stated that patients from rural areas expressed a treatment need less often than those from urban areas and that the girls seek more orthodontic treatment than boys. But with the exponential growth in social media handles such as Twitter, Facebook, Instagram, YouTube, one has immense potential to gain knowledge and become aware of things that were hard to be comprehended earlier [8,9]. Graf I et al., studied orthodontic-related posts on Twitter and Instagram and found that there are significant differences between posts on Twitter and Instagram and the latter contained more posts, categorised as positive [10].

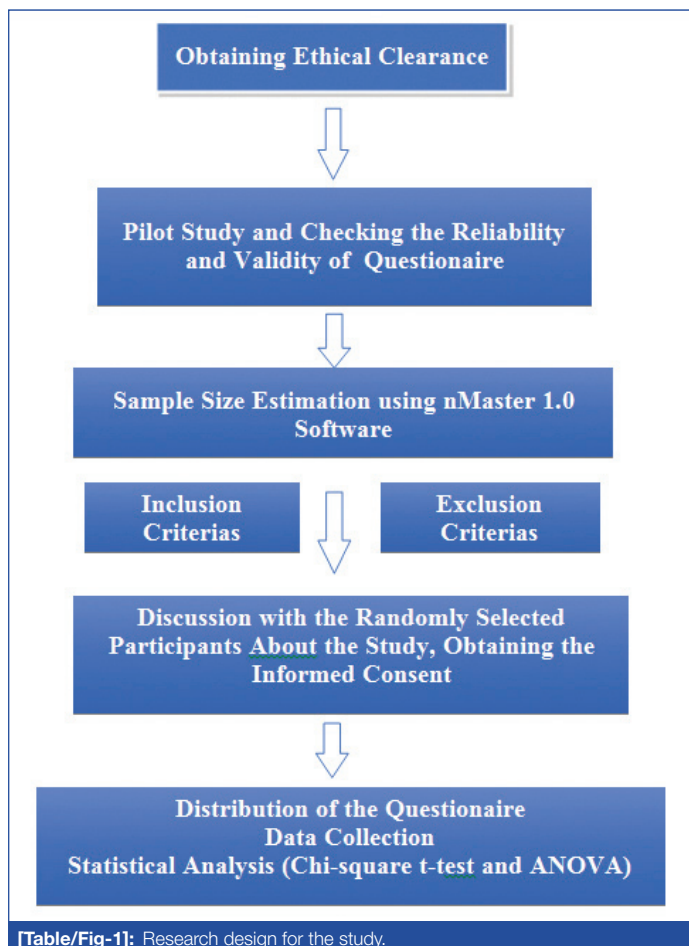
Other than social media, parents and dentists both play a pivoting role in motivating their wards for Orthodontic treatment. Demographic factors such as gender, age, socio-economic status, previous dental visits, and acquaintance with orthodontic appliances affect the perception of the treatment [11]. Adults, who did not have the opportunity to take an orthodontic treatment at a younger age due to lack of information or lack of financial resources, are now approaching an orthodontic correction. If the parents or patient did not have a clear understanding of the duration, a possibility of extraction of more than one tooth, possible discomfort in eating, speaking, maintaining oral hygiene, then it becomes difficult in reaching satisfactory outcomes as compared to those who are aware of these possibilities. Patients often perceive the effectiveness of treatment by comparing the outcome with their expectations. The gap between those expectations and the ongoing procedures determines their cooperation towards the treatment regimes. Such unfulfilled expectations can lead to dissatisfaction and non cooperation.

The cross sectional descriptive questionnaire study carried out by Sawai DS et al., in private clinics in Patna, concluded that moderate awareness, negative perception (on Likert scale), and fair practice was maintained towards periodontal health during orthodontic treatment [12]. No study to date is documented from the region of eastern Uttar Pradesh, western Bihar and Jharkhand therefore this study was designed to determine the knowledge and awareness about orthodontic treatment in Purvanchal region among patients reporting to the Unit of Orthodontics Outpatient Department (OPD)

and to compare the level of knowledge and awareness among the subjects depending upon age, gender, and area of residence.

## MATERIALS AND METHODS

This is a self-designed questionnaire-based, descriptive and cross-sectional study. The study was conducted from May 2018 to June 2019 at the Faculty of Dental Sciences, Unit of Orthodontics, Banaras Hindu University, (Varanasi, Uttar Pradesh, India) which caters the need of eastern Uttar Pradesh, western Bihar, Jharkhand and some parts of Madhya Pradesh. This area is commonly known as Purvanchal (a geographic sub-region within the larger Bhojpuri region). The approval was taken from the University's Ethical Committee (Dean/2018/EC/1720). Research design is presented in [Table/Fig-1].



**Inclusion criteria:** Patients aged between 10-30 years, reporting to the unit of orthodontics for consultation, coming from Purvanchal area, who can independently fill the questionnaire form and give their consent were included in the study.

**Exclusion criteria:** Patients undergoing orthodontic treatment or any of the siblings under orthodontic treatment, patients with any mental illness, patients who cannot read or write or those not willing to participate in the survey were excluded from the study.

Subjects who met the inclusion criteria were selected by using the purposive sampling technique.

**Sample size calculation:** The sample size was estimated using nMaster 1.0 Software. The expected proportion was assumed to be 0.5 as having good knowledge, attitude, and hygiene practices with relative prediction to be 10% and confidence level to be 95%. The sample size was computed to be 1748. Keeping in mind the non-response in form of incomplete data the sample size was further increased to 2112. A convenient sampling technique was used for the required number of samples both from rural (R) and urban (U) areas reporting to the unit of Orthodontics and Dentofacial Orthopaedics, from Purvanchal region (Uttar Pradesh) for treatment.

The sample consisted of randomly selected 1316 males and 796 females. Care was taken to categorise the patients reporting from rural and urban areas.

## Questionnaire

The questionnaire (Bilingual i.e., Hindi and English) was validated by four subject experts and a public health dentist to ascertain its relevancy, appropriateness, and validity [Annexure-1]. It was taken care that the questionnaire did include questions on specialties of dentistry, motivation factor, treatment duration, different advances and treatment options, and post-treatment precautions or instructions. Initially, 23 questions were listed. Then three redundant questions were deleted. The questions were further modified by adding two more questions and it was again verified by two orthodontists and a public health dentist. These 22 questions were then translated into Hindi by the subject expert. The translated questions (Hindi) were then given to an English language expert and were asked to translate them back to English. This back-translated English question was then compared with the original. In this questionnaire, there were 22 questions and out of those, 20 questions had the same meaning before and after the translations. Thus, Linguistic validity was 90.9%. The internal consistency of questionnaires was measured by applying Cronbach's Alpha (0.659) and Lawshe's index (0.626). A pilot survey was conducted, before the main survey on 200 randomly selected participants who were not a part of the main study. The statistical validity of the questionnaire was 81% and reliability of the questionnaire is presented in [Table/Fig-2].

Reliability statistics			
Cronbach's Alpha	Part 1	Value	0.514
		N of items	11a
	Part 2	Value	0.295
		N of items	11b
Total N of items			22
Correlation between forms			0.429
Spearman-brown coefficient	Equal length		0.601
	Unequal length		0.601
Guttman split-half coefficient			0.596
a. The items are: Q1, Q2, Q3, Q4, Q6, Q7, Q8, Q9, Q10, Q11, Q13.			
b. The items are: Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q22, Q21, Q5, Q12.			
<b>[Table/Fig-2]:</b> Reliability Statistic for 22 Questions. (Analysis of Variance test used)			

These 22 systematised multiple-choice questions (Q1-Q22) were self-administered and close-ended and were given to the participants wanting to undergo orthodontic treatment to test their knowledge and awareness. Out of 22 questions, 14 questions had two options whereas eight questions had four options. During the entry phase, the data was checked and rechecked by another investigator (SK) who was unaware of the study. Later, it was coded and entered into the Excel Sheet by another investigator (AA). The time taken to complete the questionnaire was 10-15 minutes for all respondents. It was found to be clear, feasible, and there was no ambiguity in the language (the patient's questionnaire was replaced with few layman terms to make them easy to understand the question/options given). A printed participant information sheet was provided to all and informed consent was taken from each participant before starting the study. The recorded data were entered into Microsoft Excel 2013 computer program. Further total sample size was considered in calculating awareness based on the correct answers as per age, gender and residence.

## STATISTICAL ANALYSIS

After entry of data in Microsoft Excel 2007, Statistical Package for the Social Sciences (SPSS) version 20.0 (SPSS Inc., Chicago, IL, USA) was used to analyse the data. Descriptive statistics was used

to determine demographic details. Correlation analysis was used to determine association between different variables of the study. The CV ratios of the framed questions from 1 to 22 are 0.56, 0.67, 0.87, 0.53, 0.78, 0.65, 0.62, 0.45, 0.67, 0.78, 0.66, 0.57, 0.56, 0.85, 0.44, 0.56, 0.43, 0.62, 0.52, 0.72, 0.72 and 0.55, respectively. Chi-square t-test was carried, and the level of significance was set as p-value ≤ 0.001. The level of awareness was calculated as:

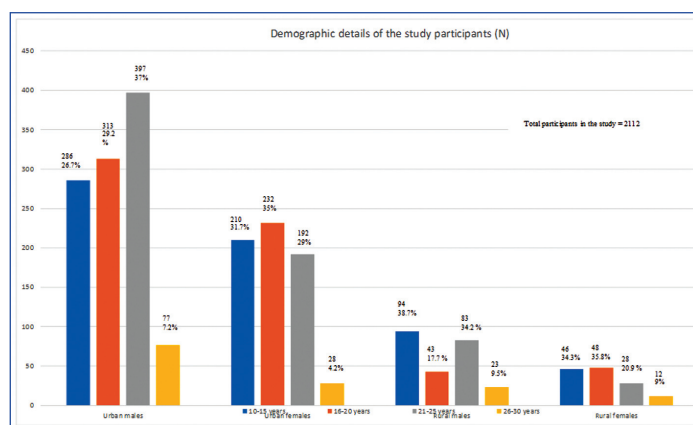
Poor Awareness (Mean -1 SD)

Moderate Awareness (Mean -1 SD to Mean +1 SD)

High Awareness (Mean +1 SD)

## RESULTS

A total of 2197 subjects were contacted for data collection, out of them 85 respondents were excluded due to partial or complete non response, therefore the effective sample size was 2112. Thus, the non response rate was 3.87. A total of 2112 patients participated in the present study. Among them, 1735 (82.2%) were from urban locations of (Purvanchal region (Uttar Pradesh) and 377 (17.8 %) were from rural areas. Total 796 (37.6%) subjects of the study were females and 1316 (62.3%) were males. They were further divided into 4 subgroups of 10-15 years (male=380, female=256), 16-20 years (male=356, female=280), 21-25 years (male=480, female=220) and 26-30 years (male=100, female=40), respectively. The demographic details and awareness of the participants are given in [Table/Fig-3,4].



[Table/Fig-3]: Demographic details of the study participants (N=2112). (Statistically significant when p-value ≤ 0.001, N=2112)

Parameters	Sub-division	% Awareness (Based on correct replies)	Significance (χ <sup>2</sup> , df, p)
Age	10-15 years	18.9%	68.329a, 6, p-value ≤ 0.001
	16-20 years	25.0%	
	21-25 years	14.3%	
	26-30 years	2.6%	
Gender	Male	21.3%	42.252a, 2, p-value ≤ 0.001
	Female	12.4%	
Residence	Urban	19.4%	39.434a, 2, p-value ≤ 0.001
	Rural	20.4%	

[Table/Fig-4]: Awareness based on correct replies. (Chi-square test, Statistically significant when p-value ≤ 0.001, N=2112)

Overall awareness in the study was found to be maximum for 16-20 years (25%) and minimum for 26-30 years 2.6%. Based on gender it was 21.3% in males. While considering the area of residence the awareness was found to be almost equal in urban (19.4%) and rural (20.4%) [Table/Fig-4].

Question number 3, 6, 9, 10, 11, 15, 17, 21 and 22 [Table/Fig-5] was found to be highly significant (p ≤ 0.001) considering all the 3 variables i.e., age, gender and residence. In question 3, age 21-25 years (660 individuals (34.5%)) were highest and age group 26-30 years {100 individuals (5.2%)} were found to be lowest in

responding correctly, 1216 (63.6%) were males and 1565 (81.9%) were from urban region and awareness was found to be 19.8%. In question 6, age 16-20 years {396 individuals (39%)} were highest and age group 26-30 years (40 individuals (6.6%)) were found to be lowest in responding correctly, 576 (56.7%) were males and 813 (80%) were from urban region and awareness was found to be 35.3%. In question 9, age 21-25 years (500, 39.7%) were highest and age group 26-30 years (60, 4.8%) were found to be lowest in responding correctly, 820 (65.1%) were males and 1016 (80.6%) were from urban region and awareness was found to be 22.1%.

In question 10, age 21-25 years (340, 41.5%) were highest and age group 26-30 years (80, 9.8%) were found to be lowest in responding correctly, 560 (68.3%) were males and 660 (80.5%) were from urban region and awareness was found to be 22.1%. In question 15, age 21-25 years (260, 39.6%) were highest and age group 26-30 years (40, 6.1%) were found to be lowest in responding correctly, 456 (69.5) were males and 554 (84.5%) were from urban region and awareness was found to be 33.4%. In question 17, age 16-20 years (276, 37.5%) were highest and age group 26-30 years (20, 2.7%) were found to be lowest in responding correctly, 576 (78.3%) were males and 583 (79.2%) were from urban region and awareness was found to be 46.1%. In question 21, age 21-25 years (460, 34.5%) were highest and age group 26-30 years (20, 1.5%) were found to be lowest in responding correctly, 916 (68.8%) were males and 1100 (82.6%) were from urban region and awareness was found to be 20.9%. In 13 out of 22 questions the number of correct answers increased from age 10-15 years to 21-25 years [Table/Fig-6].

## DISCUSSION

The most important factor in orthodontic treatment is patients' perception of successful treatment outcomes in the form of functional and aesthetic needs. Based on which the multiple-choice questionnaires were designed to address; identification of malalignment of teeth and its association with appearance, detrimental effects of habits, environmental influences, age and duration of treatment, choice of appliances along with its feasibility and overall dental health. Reports based on this will motivate the general public and help us to assess the future requirement of treatment needs. The study was conducted for 1 year on 2112 participants, 82.2% of them were from urban locations out of which 62.3% are male and the rest are female. It does not represent the whole Indian population but rather gives an estimate of orthodontic awareness in patients from eastern Uttar Pradesh and western Bihar.

In 13 out of 22 questions, the number of correct answers increased from age 10-15 years to 21-25 years. This is in accordance with the study of Wedrychowska-szulc B and Syryńska M, where with increasing age patients are more aware of their malocclusion [8]. However, we found that at 26-30 years of age the awareness seems to have decreased awareness. Probably this patient group has different subjective needs for orthodontic treatment than younger patients. They are concerned not only about their dental aesthetics but also their functional ability to maintain their teeth longer. This highlights the fact that a smaller number of adult patients are seeking orthodontic treatment. Hence more emphasis must be given to educate and motivate them.

The development of a positive attitude and growing public interest in oral health will eventually increase the demand for orthodontic treatment. In this study, 34.4% of the people in the age group 21-25 years had heard the term "Orthodontist" [Table/Fig-6]. Also, the correct knowledge about orthodontics as the branch of dentistry dealing with braces was seen in 35.6% of people in the age group 16-20 years. Out of which 79.9% belong to the urban residence, as participants in urban areas will have more access to dental care compared to their rural counterparts. A self-administered



S. No.	Questions	Age (years) N (%)					p-value, df, $\chi^2$	Gender N (%)			Residence N (%)			Awareness	
		10-15	16-20	21-25	26-30	Male		Female	p-value, df, $\chi^2$	Urban	Rural	p-value, df, $\chi^2$	%	p-value	
1	The branch of dentistry which deals with the braces?	380 (28.4%)	476 (35.6%)	380 (28.4%)	100 (7.5%)	$\leq 0.001$ , 3, 68.361	816 (61.1%)	520 (38.9%)	0.125, 1, 2.353	1068 (79.9%)	268 (20.1%)	$\leq 0.001$ , 1, 12.105	26.8%	<0.001	
2	Have you heard the term "Orthodontist"?	416 (28.7%)	496 (34.2%)	500 (34.4%)	40 (2.8%)	$\leq 0.001$ , 3, 1.361	896 (61.7%)	556 (38.3%)	0.397, 1, (0.718)	1189 (81.9%)	263 (18.1%)	0.640, 1, 0.218	24.8%	<0.001	
3	Do you believe proper teeth alignment is necessary for better facial appearance?	536 (28%)	616 (32.2%)	660 (34.5%)	100 (5.2%)	$\leq 0.001$ , 3, 1.298	1216 (63.6%)	696 (36.4%)	$\leq 0.001$ , 1, 14.257	1565 (81.9%)	347 (18.1%)	0.269, 1, 1.224	19.8%	<0.001	
4	You are in need of orthodontic treatment because:	340 (32.2%)	316 (29.9%)	360 (34.1%)	40 (3.8%)	$\leq 0.001$ , 3, 29.355	656 (62.1%)	400 (37.9%)	0.857, 1, 0.032	868 (82.2%)	188 (17.8%)	0.955, 1, 0.003	22.6%	<0.001	
5	Un-aesthetic appearance may not result due to:	340 (38.6%)	240 (27.3%)	260 (29.5%)	40 (4.5%)	$\leq 0.001$ , 3, 56.203	540 (61.4%)	340 (38.6%)	0.448, 1, 0.576	716 (81.4%)	164 (18.6%)	0.425, 1, 0.636	22.8%	<0.001	
6	Are you aware of the duration of orthodontic treatment?	280 (27.6%)	396 (39%)	300 (29.5%)	40 (6.6%)	$\leq 0.001$ , 3, 84.437	576 (56.7%)	440 (43.4%)	$\leq 0.001$ , 1, 26.309	813 (80%)	203 (20%)	0.014, 1, 6.057	35.3%	<0.001	
7	Orthodontic treatment can be rendered at any age?	376 (30.9%)	380 (31.2%)	400 (32.9%)	60 (4.9%)	0.003, 3, 14.320	780 (64.1%)	436 (35.9%)	0.043, 1, 4.106	1009 (83%)	207 (17%)	0.247, 1, 1.338	24.5%	<0.001	
8	Approximate duration of orthodontic treatment is usually:	316 (25.6%)	400 (32.4%)	420 (34%)	100 (8.1%)	$\leq 0.001$ , 3, 35.702	740 (59.9%)	496 (40.1%)	0.006, 1, 7.555	1004 (81.2%)	232 (18.8%)	0.190, 1, 1.719	29.0%	<0.001	
9	Does orthodontic treatment cause pain?	300 (23.8%)	400 (31.7%)	500 (39.7%)	60 (4.8%)	$\leq 0.001$ , 3, 1.007	820 (65.1%)	440 (34.9%)	$\leq 0.001$ , 1, 10.196	1016 (80.6%)	244 (19.4%)	0.027, 1, 4.887	22.1%	<0.001	
10	Do you think the orthodontic treatment is expensive?	160 (19.5%)	240 (29.3%)	340 (41.5%)	80 (9.8%)	$\leq 0.001$ , 3, 98.115	560 (68.3%)	260 (31.7%)	$\leq 0.001$ , 1, 20.425	660 (80.5%)	160 (19.5%)	0.112, 1, 2.524	22.1%	<0.001	
11	Are you aware of the fact that you will have to follow extra oral hygiene and restricted food habit instructions during orthodontic treatment?	576 (31.1%)	576 (31.1%)	580 (31.3%)	120 (6.5%)	$\leq 0.001$ , 3, 25.398	1116 (60.3%)	736 (39.7%)	$\leq 0.001$ , 1, 26.958	1521 (82.1%)	331 (17.9%)	0.943, 1, 0.005	20.5%	<0.001	
12	Habit which causes malalignment of teeth:	120 (50%)	40 (16.7%)	80 (33.3%)	0	$\leq 0.001$ , 3, 69.769	160 (66.7%)	80 (33.3%)	0.139, 1, 2.188	174 (72.5%)	66 (27.5%)	$\leq 0.001$ , 1, 17.194	33.3%	<0.001	
13	What do you expect from orthodontic treatment?	258 (29.5%)	275 (31.5%)	281 (32.2%)	60 (6.9%)	0.649, 3, 1.647	536 (61.3%)	338 (38.7%)	0.433, 1, 0.614	710 (81.2%)	164 (18.8%)	0.357, 1, 0.746	27.3%	<0.001	
14	Are you aware of tooth-coloured braces?	273 (26.6%)	376 (36.6%)	359 (34.9%)	20 (1.9%)	$\leq 0.001$ , 3, 1.044	616 (59.9%)	412 (40.1%)	0.027, 1, 4.865	853 (83%)	175 (17%)	0.334, 1, 0.934	30.9%	<0.001	
15	Does orthodontic treatment always require extraction?	180 (27.4%)	176 (26.8%)	260 (39.6%)	40 (6.1%)	$\leq 0.001$ , 3, 18.168	456 (69.5%)	200 (30.5%)	$\leq 0.001$ , 1, 21.014	554 (84.5%)	102 (15.5%)	0.064, 1, 3.437	33.4%	<0.001	
16	Commonly removed teeth during orthodontic treatment:	220 (25.6%)	240 (27.9%)	320 (37.2%)	80 (9.3%)	$\leq 0.001$ , 3, 35.119	520 (60.5%)	340 (39.5%)	0.147, 1, 2.104	684 (79.5%)	176 (20.5%)	0.009, 1, 16.764	30.2%	<0.001	
17	Do you know what a retainer is?	240 (32.6%)	276 (37.5%)	200 (27.2%)	20 (2.7%)	$\leq 0.001$ , 3, 61.023a	576 (78.3%)	160 (21.7%)	$\leq 0.001$ , 1, 1.224	583 (79.2%)	153 (20.8%)	0.01, 1, 6.648	46.1%	<0.001	
18	Should retainers be worn after braces?	300 (26.9%)	396 (35.5%)	400 (35.8%)	20 (1.8%)	$\leq 0.001$ , 3, 1.196	716 (64.2%)	400 (35.8%)	0.064, 1, 3.438	912 (81.7%)	204 (18.3%)	0.586, 1, 0.297	25.1%	<0.001	
19	Are you aware of orthopaedic correction for correction of small lower jaw can be done with orthodontics?	200 (42.0%)	76 (16.0%)	160 (33.6%)	40 (8.4%)	$\leq 0.001$ , 3, 72.713	316 (66.4%)	160 (33.6%)	0.037, 1, 4.347	376 (79%)	100 (21%)	0.041, 1, 4.179	37.8%	<0.001	
20	Can Forward or backward jaw position can be treated at any age?	380 (33.5%)	336 (29.6%)	380 (33.5%)	40 (3.5%)	$\leq 0.001$ , 3, 45.209	736 (64.8%)	400 (35.2%)	0.011, 1, 6.428	924 (81.3%)	212 (18.7%)	0.293, 1, 1.104	26.3%	<0.001	
21	Good correction of proclined teeth can be achieved with:	456 (34.2%)	396 (29.7%)	460 (34.5%)	20 (1.5%)	$\leq 0.001$ , 3, 1.657	916 (68.8%)	416 (31.2%)	$\leq 0.001$ , 1, 64.053	1100 (82.6%)	232 (17.4%)	0.497, 1, 0.461	20.9%	<0.001	
22	Instructions after braces treatment for maintaining the corrected teeth:	220 (37.9%)	180 (31.0%)	140 (24.1%)	40 (6.9%)	$\leq 0.001$ , 3, 36.105	280 (48.3%)	300 (51.7%)	$\leq 0.001$ , 1, 67.064	478 (82.4%)	102 (17.6%)	0.845, 1, 0.038	27.4%	<0.001	

[Table/Fig-5]: Correct responses to various questions.

(Chi-square test was used to determine level of significance, df=Degrees of freedom. Statistically highly significant when p-value  $\leq 0.001$ , N=2112)

Question no.	Age (years)				Gender		Region		N
	10-15	16-20	21-25	26-30	Female	Male	Urban	Rural	
1.	380	476	380	100	520	816	1068	268	1336
2.	416	496	500	40	556	896	1189	263	1452
3.	536	616	660	100	696	1216	1565	347	1912
4.	340	316	360	40	400	656	868	188	1056
5.	340	240	260	40	340	540	716	164	880
6.	280	396	300	40	440	576	813	203	1016
7.	376	380	400	60	436	780	1009	207	1216
8.	316	400	420	100	496	740	1004	232	1236
9.	300	400	500	60	440	820	1016	244	1260
10.	160	240	340	80	260	560	660	160	820
11.	576	576	580	120	736	1116	1521	331	1852
12.	120	40	80	0	80	160	174	66	240
13.	258	275	281	60	338	536	710	164	874
14.	273	376	359	20	412	616	853	175	1028
15.	180	176	260	40	200	456	554	102	656
16.	220	240	320	80	340	520	684	176	860
17.	240	276	200	20	160	576	583	153	736
18.	300	396	400	20	400	716	912	204	1116
19.	200	76	160	40	160	316	376	100	476
20.	380	336	380	40	400	736	924	212	1136
21.	456	396	460	20	416	916	1100	232	1332
22.	220	180	140	40	300	280	478	102	580

[Table/Fig-6]: Data of correct responses.

questionnaire-based study was done by Pandey M et al., on 1010 subjects where it was found that the maximum number of patients who underwent orthodontic treatment were from the urban population, which is similar to the present study [13]. Overall awareness among school children was 45.1%. Knowledge about the orthodontic procedures was higher in girls.

The significance of appearance is important in all stages of human life because with age individuals develop increased self-consciousness. They harbour a belief that others judge their personality by their physical appearance. Hence this makes them more concerned about their general health [14]. A 34.1% of individuals understand the need for orthodontic treatment and 34.5% [Table/Fig-5] of individuals are aware of the relationship between proper teeth alignment and facial appearance for the age group 21-25 years. The latter is highly significant ( $p$ -value  $<0.001$ ) with males showing more awareness than females {male=1216 (63.6%), females=696 (36.4%)}. Total 65.1% of the males have correctly answered that orthodontic treatment does not cause severe pain, depicting more tolerance towards pain in comparison to females. Thus, males are more concerned about their facial appearance, have a higher pain threshold and a favourable attitude for undergoing orthodontic treatment in comparison to females. However, in the study by Kolasani SR et al., both the genders had the same expectation of improved appearance and males are more aware of social well-being [14]. This is contradictory to Shekar S et al., stating awareness is significantly higher among females in urban areas and Baswaraj et al., where 75% of females were concerned with their facial attractiveness compared to 69% of males [15,16]. The awareness of having tooth-coloured braces is more in older age groups with male predominance which was not reported earlier in literature. [Table/Fig-7] presented comparison between questionnaire-based studies on awareness on orthodontics conducted in India, in the last decade [12,13,15,16].

Criteria's	Present study (2022)	Sawai DS et al., (2019) [12]	Shekhar S et al., (2017) [15]	Baswaraj et al., (2015) [16]	Pandey M et al., (2014) [13]
Duration of study	One year	One month	Two months	-	Three months
Sample size (N)	2112	134	441	230	1010
Region	Purvanchal region	Patna	Mysuru	Bengaluru, Karnataka	Bilaspur
Residence (Urban/rural)	Both	Urban	Both	Urban	Both
Number of questions in the study	22	22	17	23	9
Awareness	Higher in Urban males	Moderate awareness in majority of participants	Higher among females in urban areas.	Higher in female dental students and house surgeons.	Higher among girls in urban area.

[Table/Fig-7]: Comparison between questionnaire-based studies on awareness on orthodontics done in the last decade in India [12,13,15,16].

The fact that orthodontic treatment can be rendered at any age showed an increase in the percentage of correct responses with 30.9%, 31.2% and 32.9% in 10-15 years, 16-20 years, 21-25 years respectively. This is similar to the results of the study by Reichmuth M et al., that it is difficult to assess the demand for orthodontic treatment in children and it will considerably change with increasing age [17]. The age group of 10-15 years has given 50% correct answers regarding the association of habits to malalignment of teeth as such habits tend to decapitate with age.

Livas C and Delli K concluded that adults generally underestimated the need for definitive treatment in case of dental problems. But with the correct knowledge, attitude, environment and reciprocal

interaction, especially in the age of social media, individual and occupational demands have become high [18]. This fact can be seen by 75.1% of the rural population being more aware of orthodontics as compared to 65.4% of the urban population. Some probable reasons for the above could be better communication, exchange of ideas and availability of internet in this region.

Due to the influence of these factors, the younger age group of 10-15 years were 42% aware of orthopaedic correction of the lower jaw ( $p$ -value  $<0.001$ ). Forward and backward positioning of the jaw cannot be done at any age and awareness about this is statistically significant ( $p$ -value  $<0.001$ ) in all age groups. This age group is more aware (38.6%) of the fact that proclined upper anterior teeth do cause facial disfigurement. This could be either due to constant peer pressure or bullying in school about their forwardly placed dentition. Thus, we can see the importance of early intervention of orthodontic treatment in children to ensure complete mental and physical development.

In the present study, 68.3% of males agreed that orthodontic treatment is cost-effective compared to females (31.7%). This can be because males of the age group 21-25 years (41.5%) are earning members of our society. This is following per under Kawamura M et al., and Barrieshi Nusair K et al., who stated that in a developing country like India, the level of dental health knowledge, positive attitude, and dental health behaviour are interlinked with the level of education and income [19,20].

The knowledge, attitude and practice of oral hygiene along with restricted food habits is crucial at the time of orthodontic treatment [21]. This study showed 60.3% of males and all age groups except 26-30 years are aware of its importance depicting negligence in older age. But Nadar S and Dinesh SP concluded that an average of 44% of the population was aware of oral hygiene measures with the females being more aware compared to the males [21]. Baheti M and Toshniwal NG represented 50% of patients seeking fixed orthodontic treatment were unaware of gingival health and 78% did not maintain proper oral hygiene despite being given thorough instructions [22]. Thus, it is essential to communicate in detail about the risks and benefits before starting fixed orthodontic treatment. Oral hygiene instructions should be given in the form of handouts to everyone. The age group of 21-25 years are more aware of extraction (39.6%) and have also given the correct answers as premolars being the most commonly extracted teeth (37.2%) with a male predominance of 69.5%.

Retainers help to prevent relapse ensuring the long-term success of orthodontic treatment. In this study, 16-20 years (35.5%) and 21-25 years (35.8%) age group had given correct answers to the use and purpose of retainers in orthodontic treatment with male predominance (78.3%) [Table/Fig-6]. Awareness associated with wearing a retainer after treatment to maintain the corrected teeth is high in the 10-15 years age group (37.9%) with female predominance (51.7%). This is contrary to the questionnaire survey of Almarzooq NH et al., which observed inadequate knowledge regarding the duration and use of retainers [23].

### Limitation(s)

In this study, age groups are categorised from 10-30 years. The psychological status and level of perception of children between 10-15 years differs from that of adult age groups which might be a limiting factor in positive and negative responses. The responses of the framed questionnaire could have been homogenous. For example, all the questions either have answers in form of yes or no or multiple-choice questions with four options.

### CONCLUSION(S)

Overall awareness in the study was found to be maximum for 16-20 years (25%) and minimum for 26-30 years 2.6%. Males were more

aware than females about orthodontic treatment. Furthermore, there is an increase in awareness of orthodontic treatment needs among the urban male population in eastern Uttar Pradesh and western Bihar. Adjunctive and comprehensive orthodontic treatment in adults will help in emphasising cosmetic dentistry. As the overall awareness seems to be poor in the population group under study, there is a need for public awareness programs at the mass level in form of hand-outs, public teachings through seminars, school health programs and other community-based outreach camps. A comparative longitudinal study with the same sample groups could be designed for pre and post-treatment to analyse the increase in awareness and knowledge.

### REFERENCES

- [1] Sureshbabu AM, Chandu GM, Shatuilla MD. Prevalence of malocclusion and orthodontic treatment needs among 13-15-year-old school children of Davangere city Karnataka, India. *Journal of India Association of Public Health Dentistry*. 2005;6:32-35.
- [2] Sivakumar KM, Chandu GN, Subba Reddy VV, Shafiulla MD. Prevalence of malocclusion and orthodontic treatment needs among middle and high school children of Davangere city, India by using dental aesthetic index. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. 2009;27:211-18.
- [3] Proffit WR, Fields HW Jr, Moray LJ. Prevalence of malocclusion and orthodontic treatment needs in the United States: Estimates from NHANES III survey. *The International Journal of Adult Orthodontics and Orthognathic Surgery*. 1998;13:97-106.
- [4] Al-Emran S, Wisth PJ, Böe OE. Prevalence of malocclusion and need for orthodontic treatment in Saudi Arabia. *Community Dent Oral Epidemiol*. 1990;18(5):253-55.
- [5] Thilander B, Pena L, Infante C, Parada S, de Mayorga C. Prevalence of malocclusion and orthodontic treatment need in children and adolescents in Bogota, Colombia. An epidemiological study related to different stages of dental development. *Eur J Orthod*. 2001;23:153-67.
- [6] Dacosta OO. The prevalence of malocclusion among a population of northern Nigeria school children. *West Afr J Med*. 1999;18(2):91-96.
- [7] Onyeaso CO. Prevalence of malocclusion among adolescents in Ibadan, Nigeria. *Am J Orthod Dentofacial Orthop*. 2004;126(5):604-07.
- [8] Wedrychowska-Szulc B, Szyriska M. Patient and parent motivation for orthodontic treatment- A questionnaire study. *Eur J Orthod*. 2010;32(4):447-52.
- [9] Kerosuo H, Abdulkarim E, Kerosuo E. Subjective need and orthodontic treatment experience in a middle east country providing free orthodontic services: A questionnaire survey. *Angle Orthod*. 2002;72(6):565-70.
- [10] Graf I, Gerwnig H, Hoefler K, Ehlebracht Christ H, Braumann B. social media and orthodontics: A mixed-methods analysis of orthodontic-related posts on Twitter and Instagram. *Am J Orthod Dentofacial Orthop*. 2020;158(2):221-28.
- [11] Whitesides J, Pajewski NM, Bradley TG, Iacopino AM, Okunseri C. Socio-demographics of adult orthodontic visits in the United States. *Am J Orthod Dentofacial Orthop*. 2008;133(4):489.e9-14.
- [12] Sawai DS, Singh P, Tushar, Dogra M, Sultana R, Khan SA. Perception, awareness, and practice among patients seeking orthodontic treatment toward maintenance of periodontal health and factors affecting the same among patients visiting dental clinics in Patna. *J Family Med Prim Care*. 2019;8(11):3695-99.
- [13] Pandey M, Singh J, Mangal G, Yadav P. Evaluation of awareness regarding orthodontic procedures among a group of preadolescents in a cross-sectional study. *J Int Soc Prev Community Dent*. 2014;4(1):44-47.
- [14] Kolasani SR, Thirunavukkarasu R, Yugandhar G. Patient's expectations of orthodontic treatment during their initial visit: A questionnaire study. *Annals and Essences of Dentistry*. 2016;VIII(1):1a-4a.
- [15] Shekar S, Chandrashekar BR, Bhagyalakshmi A, Avinash BS, Girish MS. Knowledge, attitude, and practices related to orthodontic treatment among college students in rural and urban areas of Mysore, India: A cross sectional questionnaire study. *Indian Journal of Oral Health & Research*. 2017;3(1):09-14.
- [16] Baswaraj, Jayasudha K, Kumarswamy KM, Padmini MN, Chandralekha B, Shruthi. Dental students' perception of orthodontic treatment. *J Indian Assoc Public Health Dent*. 2015;13(1):79-82.
- [17] Reichmuth M, Greene KA, Orsini MG, Cisneros GJ, King GJ, Kiyak HA. Occlusal perceptions of children seeking orthodontic treatment: Impact of ethnicity and socioeconomic status. *Am J Orthod Dentofacial Orthop*. 2005;128:575-82.
- [18] Livas C, Delli K. Subjective and objective perception of orthodontic treatment need: A systematic review. *Eur J Orthod*. 2013;35:347-53.
- [19] Kawamura M, Sasahara H, Kawabata K, Iwamoto Y, Konishi K, Wright FA, et al. Relationship between CPITN and oral health behaviour in Japanese adults. *Aust Dent J*. 1993;38:381-88.
- [20] Barrieshi Nusair K, Alomari Q, Said K. Dental health attitudes and behaviour among dental students in Jordan. *Community Dent Health*. 2006;23:147-51.
- [21] Nadar S, Dinesh SP. A questionnaire study about oral hygiene awareness among orthodontic patients. *Int J Orthod Rehabil*. 2016;7(3):97-100.
- [22] Baheti MJ, Toshniwal NG. Survey on oral hygiene protocols among orthodontic correction-seeking individuals. *J Educ Ethics*. 2015;5(1):08-13.
- [23] Almarzooq NH, Ashqar SJ, Al Mubarak JA, Almobarak SH, Al-Mousa AH, Alhazmi MA, et al. Knowledge and practice of orthodontics retainers. *EC Dental Science*. 2020;19(2):01-07.

**PARTICULARS OF CONTRIBUTORS:**

1. Professor, Department of Endodontics, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
2. Professor, Department of Orthodontics, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
3. Professor, Department of Biostatistics, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
4. Professor, Department of Prosthodontics, Banaras Hindu University, Varanasi, Uttar Pradesh, India.
5. Junior Resident, Department of Orthodontics, Banaras Hindu University, Varanasi, Uttar Pradesh, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Ashish Agrawal,  
Faculty of Dental Sciences, Near Trauma Centre, Varanasi, Uttar Pradesh, India.  
E-mail: ashishdoc2000@yahoo.com

**PLAGIARISM CHECKING METHODS:** [Jan H et al.]

- Plagiarism X-checker: Mar 16, 2021
- Manual Googling: Sep 16, 2021
- iThenticate Software: Dec 30, 2021 (10%)

**ETYMOLOGY:** Author Origin**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Mar 12, 2021**Date of Peer Review: **May 11, 2021**Date of Acceptance: **Nov 10, 2021**Date of Publishing: **Jan 01, 2022**

1	The branch of dentistry which deals with the braces?	a) Prosthodontics	b) Periodontics	c) Orthodontics	d) Endodontics
2	Have you heard the term "Orthodontist"?	a) Yes	b) No		
3	Do you believe proper teeth alignment is necessary for better facial appearance?	a) Yes	b) No		
4	You are in need of orthodontic treatment because:	a) Aesthetics	b) Difficulty in chewing	c) Speech problem	d) Peer influence
5	Unesthetic appearance may not result due to:	a) Proclined upper and/or lower teeth	b) Short lower jaw	c) Large size of upper jaw	d) Brushing teeth more than 2 times
6	Are you aware of the duration of orthodontic treatment?	a) Yes	b) No		
7	Orthodontic treatment can be rendered at any age?	a) Yes	b) No		
8	Approximate duration of orthodontic treatment is usually:	a) 2 months	b) 2 weeks	c) 2 years	d) More than 3 years
9	Does orthodontic treatment cause severe pain?	a) Yes	b) No		
10	Do you think the orthodontic treatment is expensive?	a) Yes	b) No		
11	Are you aware of the fact that you will have to follow extra oral hygiene and restricted food habit instructions during orthodontic treatment?	a) Yes	b) No		
12	Habit which does not cause mal-alignment of teeth:	a) Thumb sucking	b) Mouth breathing	c) Pushing teeth with tongue	d) Tongue biting
13	What you do not expect from orthodontic treatment?	a) Well aligned teeth only	b) Changes in facial appearance	c) Proper speech and chewing	d) Bleeding gums
14	Are you aware of tooth-coloured braces?	a) Yes	b) No		
15	Does orthodontic treatment always require extraction?	a) Yes	b) No		
16	Commonly removed teeth during orthodontic treatment:	a) Incisors	b) Canines	c) Premolars	d) Molars
17	Do you know what a retainer is?	a) Yes	b) No		
18	Should retainers be worn after braces?	a) Yes	b) No		
19	Are you aware of orthopaedic correction for correction of small lower jaw can be done with orthodontics?	a) Yes	b) No		
20	Can Forward or backward jaw position can be treated at any age?	a) Yes	b) No		
21	Good correction of proclined teeth can be achieved with:	a) Removable appliance	b) Fixed appliance		
22	Instructions after braces treatment for maintaining the corrected teeth:	a) Do nothing	b) Get teeth cleaned	c) Wear retainer	d) Regular recall visits for checking whether teeth are in correct position

**[Annexure-1]:** Questionnaire.



Sl No.	Questions	Responses
1	दंत चिकित्सा की शाखा जो ब्रेसेस से संबंधित है?	ए) प्रोटोडोटिक्स बी) पेरियोडोटिक्स सी) ऑर्थोडेंटिक्स डी) एडोडोटिक्स
2	क्या आपने "ऑर्थोडॉन्टिस्ट" शब्द सुना है?	ए) हाँ बी) नहीं
3	क्या आपको लगता है कि बेहतर चेहरे की सुंदरता के लिए उचित दाँत एलाइनमेंट आवश्यक है?	ए) हाँ बी) नहीं
4	आपको ऑर्थोडॉटिक उपचार की आवश्यकता लगती है क्योंकि:	ए) सुंदरता के लिए बी) चबाने में कठिनाई सी) बोलने की समस्या डी) परिवार प्रभाव
5	खराब दिखना इन कारणों से नहीं हो सकता:	ए) ऊपरी और / या निचले दाँतों का बहार की तरफ निकलना बी) नीचे जबड़ा छोटा होना सी) ऊपरी जबड़े का बड़े आकार डी) ब्रशिंग दाँत 2 बार से अधिक
6	क्या आप ऑर्थोडॉटिक उपचार की अवधि से अवगत हैं?	ए) हाँ बी) नहीं
7	ऑर्थोडॉटिक उपचार किसी भी उम्र में प्रदान किया जा सकता है?	ए) हाँ बी) नहीं
8	ऑर्थोडॉटिक उपचार की लगभग अवधि आमतौर पर है:	ए) 2 महीने बी) 2 सप्ताह सी) 2 साल डी) 3 साल से अधिक
9	क्या ऑर्थोडॉटिक उपचार के कारण दर्द होता है?	ए) हाँ बी) नहीं
10	क्या आपको लगता है कि ऑर्थोडॉटिक उपचार महंगा है?	ए) हाँ बी) नहीं
11	क्या आप इस तथ्य से अवगत हैं कि आपको ऑर्थोडॉटिक उपचार के दौरान अतिरिक्त मौखिक स्वच्छता और प्रतिबंधित भोजन की आदत के निर्देशों का पालन करना होगा?	ए) हाँ बी) नहीं
12	आदत जिसके कारण दाँतों की खराब एलाइनमेंट होती है:	ए) अंगूठे चूसना बी) मुँह से साँस लेने सी) जीभ के साथ दाँतों को धक्का देना डी) जीभ काटने
13	ऑर्थोडॉटिक उपचार से आप क्या उम्मीद नहीं करते हैं?	ए) अच्छी तरह गठबंधन वाले दाँत सी) उचित भाषण और चबाने की प्रक्रिया बी) चेहरे की सुंदरता में परिवर्तन डी) रक्त साव मसूड़ों
14	क्या आप दाँत के रंग के ब्रेसेज से अवगत हैं?	ए) हाँ बी) नहीं
15	क्या ऑर्थोडॉटिक उपचार में हमेशा दाँत निकासी की आवश्यकता होती है?	ए) हाँ बी) नहीं
16	ऑर्थोडॉटिक उपचार के दौरान आमतौर पर हटाए गए दाँत:	ए) इसिसोर बी) कैनाइन सी) प्रेमोलार डी) मोलर
17	क्या आप जानते हैं कि उपचार के बाद दाँतों को रोक रखने वाला उपयंत्र क्या है?	ए) हाँ बी) नहीं
18	क्या रिटेंनर, ब्रेसेस के बाद पहना जाना चाहिए?	ए) हाँ बी) नहीं
19	क्या आप छोटे से जबड़े के सुधार के लिए आर्थोपेडिक सुधार के बारे में जानते हैं, ऑर्थोडोटिक्स के साथ किया जा सकता है?	ए) हाँ बी) नहीं
20	आगे या पीछे जबड़े की स्थिति का किसी भी उम्र में इलाज किया जा सकता है?	ए) हाँ बी) नहीं
21	संशोधित दाँतों का अच्छा सुधार प्राप्त किया जा सकता है?	ए) रिमूवल बी) फिक्स्ड
22	सही दाँत बनाए रखने के लिए ब्रेसिंग उपचार के बाद निर्देश:	ए) कुछ भी नहीं करें बी) दाँतों को साफ कर लें सी) रिटेंनर पहनें डी) दाँतों की सही स्थिति में हैं या नहीं यह जांचने के लिए नियमित रूप से याद की गई मुलाकात

[Annexure-1b]: Questionnaire- (Hindi).