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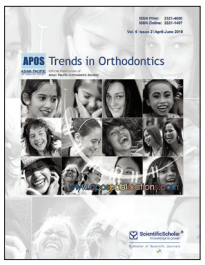

Original Article

Orthodontic treatment need and perception: A comparative study between different socio-economic groups of patients

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Received: 11 March 2021
Accepted: 10 October 2021
EPub Ahead of Print: 17 December 2021
Published: 19 April 2022

DOI
10.25259/APOS_32_2021

Quick Response Code:

ABSTRACT

Objectives: The aim of the present study was to compare parents' perceptions of their children's malocclusion and clinician-measured normative orthodontic treatment need with the socioeconomic status of the parents as a means of assessing whether demand for treatment is uniform across socioeconomic groups.

Material and Methods: In this cross-sectional study, 212 (125 girls and 87 boys) subjects between the ages of 8 and 25 years (mean age 17.03 ± 3.9) were assessed. The parents were asked to score the dental attractiveness of their children and their socioeconomic status (SES) based on the aesthetic component (AC) of the Index of Orthodontic Treatment Need (IOTN) and the modified Kuppuswamy scale (2018), respectively. The subjects recorded their self-perception using the OASIS scale. These scores were then compared within themselves and with those of the clinician who also scored the Dental Health Component (DHC) and AC of the IOTN. The AC grade of the IOTN and parents' SES was tested with the Chi-square test. The association between the AC scores of the IOTN, DHC, and the characteristics of the subjects was tested with Spearman's correlation coefficient (rho).

Results: Treatment uptake was uniform throughout the different socioeconomic groups. Association between the SES group and DHC group and clinician-measured AC were statistically not significant ($P = 0.3958$), ($P = 0.3447$). Parents, in this study population, irrespective of their socioeconomic status rated their children's orthodontic treatment need less severely than the clinician ($P = 0.0001$). Severity of malocclusion as measured by DHC was much higher in male subjects than in females ($P = 0.0348$).

Conclusion: Socioeconomic status of the parents did not seem to affect their perception of dental appearance. Self-perception of appearance and perceived treatment need was uniform throughout the different socioeconomic groups.

Keywords: Index of orthodontic treatment need, Socioeconomic status, Orthodontic treatment need, Normative treatment need, Self-perception

INTRODUCTION

Malocclusion typically causes concerns related to dental health and/or oral health that may adversely affect the quality of life. This may arise from the appearance, function, and the psychosocial impact of the teeth.

It can readily be appreciated that the demand for treatment does not necessarily reflect objective treatment needs. Some patients are quite aware of minor deviations, such as mild deviation

of upper midline, whereas others refuse treatment for malocclusions that are considered to be severe.

Reports in some populations indicate that socioeconomically deprived persons have unmet oral health needs and lack access to oral health-care services.[1,2]

It has been reported that the acceptance of orthodontic treatment was significantly less in patients from low socioeconomic backgrounds.[3]

Whether this is because of their lower perceived or normative needs, higher satisfaction with appearance of self or irregular visit to dental clinic is still unclear.

Thus far, the evidence concerning the effect of socioeconomic status (SES) on normative and perceived treatment needs is not consistent. Some studies have found a positive association between them[4,5] whereas others have not.[6,7]

There is a lack of unanimous agreement on the influence of SES on the orthodontic treatment need and perception of the malocclusion.

To the best of our knowledge, none of the studies assessed both the influence of SES on orthodontic treatment needs and oral self-perception in Indian population.

Moreover, despite the finding that patients from low SES were less likely to receive orthodontic treatment, the relationship between SES and the factors that may play a role in treatment demand and uptake has not been explored. Such information is needed for better planning of orthodontic services and to ensure that health care is provided equally among all social classes, especially in a developing nation like India.

Thus, the aim of the present study was to compare parents' perceptions of their children's malocclusion and clinician-measured normative orthodontic treatment need with the socioeconomic status of the parents as a means of assessing whether demand for treatment is uniform across socioeconomic groups.

MATERIALS AND METHODS

This research was approved by the Institutional Ethics Committee of Guru Nanak Institute of Dental Sciences and Research. In this cross-sectional study, 212 (125 girls and 87 boys) subjects between the ages of 8 and 25 years (mean age 17.03 ± 3.9) reported to the Department of Orthodontics and Dentofacial Orthopedics of the Guru Nanak Institute of Dental Sciences and Research in Kolkata. The subjects were examined from January 2018 to June 2019.

It was not possible to select a consecutive sample because of the time constraints of clinical sessions, where attending subjects were provided with an orthodontic diagnosis and treatment planning. Hence, every third patient was selected for consideration into the study sample based on the inclusion criteria.

Inclusion criteria

- Subjects attending with one and/or both parents were included in the study.

Exclusion criteria

- Subjects attending alone were excluded from the study.
- Subjects whose parents had received orthodontic treatment were excluded from the study.
- Subjects who reported with craniofacial anomalies were excluded from the study.

In total, 45 subjects were excluded based on the selection criteria.

The parents were provided with a set of questionnaires according to their preferred languages (Bengali/Hindi/English) for assertion and evaluation of SES and self-perception. Perceived treatment need was assessed by the parents themselves using IOTN aesthetic component (AC) score.

Normative treatment need of the subjects was determined by the clinician using the AC and Dental Health Component (DHC) of the IOTN, which was kept blind to the socioeconomic background of the subjects.

The IOTN is an internationally acknowledged scoring system for orthodontic treatment need, as perceived by the professionals and patients. The IOTN incorporates both a DHC (Brook and Shaw, 1989)[8] and an AC (Evans and Shaw, 1987).[9]

The DHC records various occlusal traits in five grades according to the severity and the need for orthodontic treatment (Brook and Shaw, 1989).[8] Grades 1 and 2 represent no/little need for treatment, Grade 3 gives a borderline assessment, whereas Grades 4 and 5 represent a definite need for orthodontic treatment.

The AC has a scale of 10 color photographs representing different levels of dental attractiveness, with Grade 1 representing the most attractive and Grade 10 representing the least attractive (Evans and Shaw, 1987).[9]

The parents (both in agreement with each other, wherever applicable) were asked to make a judgment about how severe they rated their child's dental attractiveness.

For evaluation of the AC, the classification by Richmond *et al*. (1995)[10] was used, where Grades 1–4 represented no or little esthetic need, Grades 5–7 borderline esthetic need, and Grades 8–10 represented a definite esthetic need for orthodontic treatment.

Self-perception of oral esthetics was assessed by subjects using the Oral Aesthetic Subjective Impact Scale (OASIS). This indicator was developed by Mandall *et al*.[11]

The OASIS measures the impact of external influences in childhood by asking questions concerning the perceptions of others and themselves, as well as about their teeth. The subjects had to answer five questions on a 7-point Likert scale, and points awarded to all the questions were added to provide an overall oral esthetic impact score as perceived by each subject. This variable was dichotomized by the medians as positive self-perception (OASIS <18) and negative self-perception (OASIS >19).[11]

Assessment of the SES

Kuppuswamy socioeconomic scale is the most widely used socioeconomic scale all over India. This scale has been endlessly revised over the years because the income categories in the scale lose their scoring following the change in the value of the rupee. Therefore, there is a need to update the scale as per the changes in consumer price index.[12] The Kuppuswamy SES has included three parameters and each parameter is further classified into subgroups and scores have been allotted to each subgroup. The total score of Kuppuswamy SES ranges from 3 to 29.

The SES was calculated using modified Kuppuswamy scale updated for year 2018[12].

This was mainly based on the occupation of the head of the family, education of the head of the family, and total monthly income of the family. Each variable was given a weight, the total of which established the socioeconomic weight. Cutoff points divided SES into five groups; lower, upper lower, lower middle, upper middle, and upper.

Reliability

To determine the method error (intraexaminer agreement), 40 subjects were reexamined 1 month after the initial examination (for subjects who started receiving the orthodontic treatment). Kappa values for the DHC and the AC were 0.92 and 0.76, respectively.

Statistical analysis

For statistical analysis, data were entered into a Microsoft Excel spreadsheet and then analyzed by SPSS (version 24.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5.

Data had been summarized as percentages (frequencies) for categorical variables.

A Chi-squared test (χ^2 test) was done for statistical hypothesis test wherein the sampling distribution of the test statistic is a Chi-squared distribution when the null hypothesis is true.

The association between the AC scores of the IOTN, DHC, and the characteristics of the subjects was tested with Spearman's correlation coefficient (rho). $P \leq 0.05$ was considered as statistically significant.

RESULTS

Distribution of the data sample

In this study, a total of 212 subjects were taken, which included 125 (59.0%) female subjects and 87 (41.0%) male subjects [Table 1].

Distribution of socioeconomic group based on modified Kuppuswamy socioeconomic scale 2018 was found to be as follows: 20 (9.4%) subjects were in upper SES, 98 (46.2%) in upper middle SES, 62 (29.2%) in lower middle SES, 30 (14.2%) in upper lower SES, and 2 (0.9%) in lower SES [Table 1].

The percentage distribution of the DHC of the IOTN as scored by the clinician was found to be as follows: 10.8% of the subjects had no/little need of DHC, 24.5% of the subjects had borderline DHC, and 64.6% of the subjects had definite need of DHC [Table 1].

According to the clinician measured AC scoring, 52 (24.5%) subjects had definite need, 77 (36.3%) subjects had

Table 1: The distribution of subjects based on gender, age, SES, IOTN DHC, IOTN AC clinician and parents, and OASIS.

Parameters	*n*	%
Gender		
Male	87	41.0
Female	125	59.0
Age		
8–12	34	16.0
13–18	100	47.2
19–25	78	36.8
SES group		
Upper	20	9.4
Upper-middle	98	46.2
Lower-middle	62	29.2
Upper-lower	30	14.2
Lower	2	0.9
DHC of IOTN		
Little need	23	10.8
Borderline	52	24.5
Definite need	137	64.6
Clinician-measured AC		
Little need	83	39.2
Borderline	77	36.3
Definite need	52	24.5
Parents AC		
Little need	94	44.3
Borderline	70	33.0
Definite need	48	22.6
OASIS group		
Negative perception	118	55.7
Positive perception	94	44.3

SES: Socioeconomic status, AC: Aesthetic component, IOTN: Index of orthodontic treatment need, OASIS: Oral Aesthetic Subjective Impact Scale, DHC: Dental health component

borderline, and 83 (39.2%) subjects had no/little esthetic need [Table 1].

On the other hand, parents AC scoring is as following, 48 (22.6%) subjects exhibited definite need, 70 (33.0%) subjects borderline, and 94 (44.3%) subjects no/little need [Table 1].

Oral esthetic self-perception had negative perception in 118 (55.7%) subjects whereas positive perception was found in 94 (44.3%) subjects as assessed by OASIS [Table 1].

The relationship between normative orthodontic treatment need (clinician-measured DHC and AC) and perceived treatment need (parent AC)

Severity of malocclusion as measured by DHC was found to be much higher in male subjects than in females.

About 93.1% of male subjects scored in borderline and definite need groups as measured by the clinician.

On the contrary, 86.4% of females reported in the borderline and definite need groups. Association of gender and DHC was statistically significant ($P = 0.0348$).

Comparison of normative treatment need (clinician-measured AC) with perceived treatment need showed the former to be most critical of malocclusions. The clinician allocated more subjects to the borderline and definite need categories (60.8%) than parents ($P = 0.0001$) [Table 2].

There was a significant correlation between DHC and the clinician-rated AC of the IOTN (Spearman's correlation coefficient, rho: 0.581, $P < 0.001$).

Orthodontic treatment need and SES

Association of SES group and DHC group was not found to be statistically significant ($P = 0.3958$) which represents the severity of malocclusion to be distributed homogeneously throughout the socioeconomic group.

The role of SES of the parent does not seem to affect the normative (clinician-measured AC) and perceived treatment need (parent AC) ($P = 0.3447$) ($P = 0.8372$) [Table 3].

OASIS and gender, age

The self-perception of the subjects as measured by the OASIS scale is not influenced by the socioeconomic status which means that familial income, occupation of the parent, and education have little role to play with the perception of the malocclusion ($P = 0.8800$) [Table 4].

Oral esthetic self-perception as measured by the OASIS did not show any difference across the three age groups and between genders ($P = 0.2315$), ($P = 0.495$).

Table 2: Association between normative treatment need (clinician-measured AC) and perceived treatment need (Parents AC).

	Parents AC			
Clinician-measured AC	**No need**	**Borderline**	**Definite need**	**Total**
No need	43	30	10	83
Row %	51.8	36.1	12.0	100.0
Col %	45.7	42.9	20.8	39.2
Borderline	34	29	14	77
Row %	44.2	37.7	18.2	100.0
Col %	36.2	41.4	29.2	36.3
Definite need	17	11	24	52
Row %	32.7	21.2	46.2	100.0
Col %	18.1	15.7	50.0	24.5
Total	94	70	48	212
Row %	44.3	33.0	22.6	100.0
Col %	100.0	100.0	100.0	100.0

AC: Aesthetic component. Chi-square value: 23.0877; *P* value: 0.0001

DISCUSSION

The demand for orthodontic treatment is influenced by a number of factors, such as, the desire to look attractive, self-perception of dental appearance, self-awareness, and peer group norms. It is often the parents who seek orthodontic treatment for improved esthetics and function for their offspring.[13] Thus, parents' attitude and understanding of malocclusion and perceived orthodontic treatment need should be considered as an important factor.

The aim of the present study was to compare parents' perceptions of their children's malocclusion with clinician-measured normative orthodontic treatment need, using the socioeconomic status of the parents as a mediator as a means of assessing whether demand for treatment is uniform across socioeconomic groups.

In the present study, a greater number of females (59%) presented for orthodontic consultation than males. This finding is supported by the previous studies.

Shaw (1981)[14] and Pietilä and Pietilä (1996)[15] showed that dissatisfaction with dental appearance was more common among girls than in boys. Brien *et al.* (1996)[16] found that girls were more frequently treated than boys.

In this study, 64.6% of the subjects had definite need of DHC similar to the findings of Hamdan *et al.* (2004)[17] where they found it to be 71%.

This seems to explain that a patient and/or parent seeks orthodontic treatment when the degree of malocclusion is severe and it is also affecting the psychosocial status.

Normative orthodontic treatment need

The severity of malocclusion as measured by DHC was much higher in male subjects than in females.

Table 3: The Chi-square test was used to analyze differences between SES groups regarding normative (clinician-measured AC and DHC) and perceived treatment need (PARENTS AC).

SES group	DHC of IOTN			AC RESEARCHER			AC PARENTS		
	Little need	Borderline	Definite need	Little need	Borderline	Definite need	Little need	Borderline	Definite need
Upper	0	6	14	7	5	8	12	4	4
Row %	0.0	30.0	70.0	35.0	25.0	40.0	60.0	20.0	20.0
Col %	0.0	11.5	10.2	8.4	6.5	15.4	12.8	5.7	8.3
Upper middle	10	28	60	40	32	26	41	34	23
Row %	10.2	28.6	61.2	40.8	32.7	26.5	41.8	34.7	23.5
Col %	43.5	53.8	43.8	48.2	41.6	50.0	43.6	48.6	47.9
Lower middle	8	13	41	25	24	13	25	23	14
Row %	12.9	21.0	66.1	40.3	38.7	21.0	40.3	37.1	22.6
Col %	34.8	25.0	29.9	30.1	31.2	25.0	26.6	32.9	29.2
Upper lower	4	5	21	11	14	5	15	8	7
Row %	13.3	16.7	70.0	36.7	46.7	16.7	50.0	26.7	23.3
Col %	17.4	9.6	15.3	13.3	18.2	9.6	16.0	11.4	14.6
Lower	1	0	1	0	2	0	1	1	0
Row %	50.0	0.0	50.0	0.0	100.0	0.0	50.0	50.0	0.0
Col %	4.3	0.0	0.7	0.0	2.6	0.0	1.1	1.4	0.0
	Chi-square value: 8.3958; *P*-value: 0.3958			Chi-square value: 8.9715; *P*-value: 0.3447			Chi-square value: 4.2156; *P*-value: 0.8372		

SES: Socioeconomic status, AC: Aesthetic component, DHC: Dental health component, IOTN: Index of orthodontic treatment need

Table 4: Association between OASIS and SES.

OASIS group	SES group					Total
	Upper	Upper-middle	Lower-middle	Upper-lower	Lower	
Positive	10	46	25	12	1	94
Row %	10.6	48.9	26.6	12.8	1.1	100.0
Col %	50.0	46.9	40.3	40.0	50.0	44.3
Negative	10	52	37	18	1	118
Row %	8.5	44.1	31.4	15.3	0.8	100.0
Col %	50.0	53.1	59.7	60.0	50.0	55.7
Total	20	98	62	30	2	212
Row %	9.4	46.2	29.2	14.2	0.9	100.0
Col %	100.0	100.0	100.0	100.0	100.0	100.0

OASIS: Oral Aesthetic Subjective Impact Scale, SES: Socioeconomic status. Chi-square value: 1.1882; *P* value: 0.8800

However, Badran *et al.* (2010)[18] found that 65% of the females reported in the borderline and definite need groups compared to 51.1% males. No association was found between gender and DHC grades as per study conducted by Doğan *et al.* (2010).[19]

This seems to suggest that males seek orthodontic treatment only when their malocclusion is severe. This may be a reflection of sex role stereotyping, wherein society places a greater emphasis on the importance of physical attractiveness in females, compared to males (Shaw *et al.,* 1991).[20]

According to the clinician's findings, 64.6% had a definite orthodontic treatment need (DHC), while 24.5% of the subjects had a severe esthetic need (AC).

The DHC of the IOTN was higher than the AC of the IOTN when recorded by the clinician (Spearman's correlation coefficient, rho: 0.581, $P < 0.001$). The reason for this difference is the registration of two different attributes: The DHC is based on occlusal characteristics, whereas the AC determines treatment need purely on esthetic grounds (Brook and Shaw, 1989).[8]

Comparison of normative and perceived treatment need

The clinician allocated more subjects to the borderline and definite need categories (60.8%) than parents which is higher than the value found by Hamdan (2004).[17]

Similarly, Badran (2010)[18] suggested that subjects in their study were less critical in their esthetic evaluation (AC score) than the examiner, which corresponds with many other studies (Evans and Shaw, 1987; Shaw *et al.*, 1991; Burden and Pine, 1995; Kerosuo *et al.*, 2004; Abu Alhaija *et al.*, 2005).[21]

The relationship between orthodontic treatment need and socioeconomic groups

In the current study, socioeconomic status of the parents did not seem to affect their perception of dental appearance. Normative treatment need and perceived treatment need have been uniform throughout the different socioeconomic groups ($P = 0.3447$ and $P = 0.8372$).

The Indian subcontinent is home to people with a wide range of socioeconomic status. With a staggering population of 1.36 billion (2019), the variation in the different socioeconomic strata is obvious. Attempts have been made over the years to classify these strata of which the modified Kuppuswamy scale has been used in this study. Thus, although similar findings have been reported in some studies such as Platia and Khanna (2016),[22] Doğan *et al.* (2010),[19] Christopherson *et al.* (2009),[2] Kerosuo *et al.* (2004),[6] and Bergström *et al.* (1998),[23] the findings reported here are unlike the others because of the price sensitivity prevalent across the different socioeconomic strata of Indian population. The perception of orthodontic treatment need remains analogous regardless of the higher qualification and high-income parents which may be due to the lack of awareness among the people regarding the dental malocclusion and its negative impact on the psychosocial well-being.

Devi *et al.* (2009)[24] reported that familial SES is not a determinant in children's satisfaction with dental appearance. Likewise, children with different SES demonstrate that they have almost completely the same approach toward braces. Burden (1995)[25] and Burden and Pine (1995)[26] found the role of peer groups to be more important for determining orthodontic treatment than social class or sex.

One study stated that the influence of SES on perceived and normative orthodontic treatment need remains unclear.[27]

Self-perception and age, gender

In this study, oral esthetic self-perception as measured by the OASIS did not show any difference across the three age groups and between genders ($P = 0.2315$).

This finding is in unison with the studies which suggest that the perceived need was not influenced by sex.[28,29]

Marques *et al.* (2009)[13] did not find any significant associations between esthetic impact and gender, age group, or self-esteem. This suggests that adolescents perceive the psychosocial effect of malocclusion in a homogeneous fashion.

However, other studies have found that females are stricter with regard to the self-perception of facial esthetics than males.[12,30,31] These differences may be explained by differences in study designs, measures, age groups, and populations.

Self-perception and socioeconomic groups

In this study, association between OASIS group and socioeconomic status was not statistically significant ($P = 0.8800$).

This seems to suggest that self-perception of appearance is uniform among different SES groups.

To the best of our knowledge, no comparison has been attempted before to report the association between self-perception as measured by OASIS scale and SES.

Limitations of the study

The present study has limitations such as:

- The subjects were selected from among the parents who reported to the Department of Orthodontics and Dentofacial Orthopedics, of Guru Nanak Institute of Dental Sciences and Research, Kolkata. Hence, they may not be the representative of the general population. The findings can only be applied to the subjects seeking orthodontic treatment. A large population comprising different demographic areas would have resulted in equal distribution of subjects in the socioeconomic groups.
- We must also pay attention before generalizing these results, as cultural variances between various study samples may influence perceptions of esthetics and treatment need.

CONCLUSION

- In the present study, greater number of females (59%) presented for orthodontic consultation than males.
- Severity of malocclusion as measured by DHC was much higher in male subjects than females.
- According to the clinician's findings, 64.6% had a definite orthodontic treatment need (DHC), while 24.5% of the subjects had a severe esthetic need (AC).
- Esthetic component was scored higher by the clinician (60.8%) as compared to the parents (55.6%).
- Socioeconomic status of the parents did not seem to affect their perception of dental appearance. Normative treatment need and perceived treatment need were uniform throughout the different socioeconomic groups.
- Oral esthetic self-perception as measured by the OASIS did not show any difference across the three age groups and between genders.

- Self-perception of appearance as measured by the OASIS was uniform among different SES groups.

ACKNOWLEDGMENT

Our aim within this study has been to evaluate the influence of socioeconomic status on the demand for orthodontic treatment.

The success and final outcome of this study required a lot of guidance and assistance from many people and I am extremely privileged to have got this all along the completion of this study. All that I have done is only due to such supervision and assistance and I would not forget to thank them.

I would like to express the deepest appreciation to my supervisor Dr. Soumo Mitra (Professor) who has the attitude and the substance of a genius: He continually and convincingly conveyed a spirit of adventure in regard to research and scholarship, and an excitement in regard to teaching. Without his guidance and persistent help, this study would not have been possible.

I would like to express my earnest gratitude to Dr. (Prof.) Samarendra Ray (Head of the department) and my coguide, for the unconditional support throughout the period of my research work and the critical corrections of the same without which the effort would have been blemished. He consistently allowed this topic to be my own work, but steered me in the right direction whenever he thought I needed it.

Declaration of patient consent

Institutional Review Board (IRB) permission obtained for the study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Pandit SK, Mitra S, Pal P. Orthodontic treatment need and perception: A comparative study between different socio-economic groups of patients. APOS Trends Orthod 2022;12:53-60.