

Need for Orthodontic Treatment in Physically Disabled Children: A Survey of Motivation, Attitude and Satisfaction

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ABSTRACT

Background: The orthodontic treatment (OT) of disabled patients has been viewed in many case series by various authors in literature. Parents play a significant role in the orthodontic care and are the most vital people in the motivation for treatment in such group of patients. These disabled patients need OT to achieve good esthetics and function. Lots of ethical issues involve treating patients orthodontically. The aim of this study was to evaluate motivation, attitude, expectations and satisfaction with OT among parents of patients with special needs.

Materials and Methods: The parents of 50 special needs Indian children with physical, mental and sensory impairment undergoing OT were surveyed. The survey was done based on attitudes towards treatment and satisfaction level with outcomes. The survey comprised of 20 questions in 4 categories: attitude with adaptation, advantages, side effects, and satisfaction level after OT. A control group comprised of parents of 50 normal healthy children undergoing OT in the same institution.

Results: Parents of special needs children undergoing OT showed increased levels of motivation and they are cooperating to participate in oral hygiene procedures. Wearing of removable appliances in disabled children was moderate in comparison to fixed appliances. There was improvement in functionality, quality of life and socio-economic concerns in disabled children.

Conclusions: The perceived level of satisfaction and expectations were high amongst the parents of special needs children with orthodontic treatment.

Keywords: Disabled, Functionality, Motivation, Orthodontic, Satisfaction, Special needs.

INTRODUCTION

Unaesthetic dental appearance may have a very high emotional impact on an individual's wellbeing.¹ The self-esteem and social concerns may be adversely affected.² The functional and esthetics components of an orthodontic treatment plan depends upon the type and severity of the

handicap.³ The face along with the oral regions seem to be the primary regions which determine attractiveness.⁴ Malocclusion is highly prevalent amongst the physical and mentally disabled individuals with almost 75% of the physically disabled patients requiring orthodontic treatment

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to obtain an optimal occlusal relationship with a comparable oral functions and esthetics.⁵⁻⁷ The orthodontic alterations aim at restoring the oral functions and improve the social acceptance of physically disabled individuals.⁸ During such treatment, the cooperation of the disabled patient and parents become important to the success of the treatment⁹ and involves ethical concerns that have been mentioned in literature by various authors.¹⁰

The Orthodontic treatment for such specially abled patients have been discussed in various case reports by different authors.¹¹⁻¹³ The parents play a significant role in such patients by motivating them.¹² However, very few studies have evaluated the factors conditioning response to orthodontic treatment in these groups of patients and the attitude of parents towards orthodontic care and no studies have included a control group of normal individuals.¹³⁻¹⁵ The aim of this study was to evaluate motivation, attitude and expectations with orthodontic treatment among physically disabled patients and their parents.

MATERIALS AND METHODS

A survey was conducted on parents of 50 children with physical, mental and sensory impairment (Special needs – SN) undergoing orthodontic treatment based on attitudes towards treatment and satisfaction level with outcomes. This survey consisted of 20 questions in 4 categories – attitude with adaptation, advantages, side effects and satisfaction level after orthodontic treatment. A control group comprising of 50 normal healthy children undergoing orthodontic treatment in the same institution were also included in the survey. All the treatments were done between 2013 and 2017 in the Special Needs section of Mahima Pain Care Hospital, Odisha, India. All the patients were between 9 and 18 years of age with the mean age being 13.5 ± 2.5 years. All the patients were able to accept dental procedures with behaviour modification techniques. Only 5 SN patients needed deep sedation or general anesthesia during lengthy procedures such as impression taking and bonding of brackets for an enhanced cooperation. Patients needing orthognathic surgery were excluded from the study.

The diagnosis of orthodontic treatment done in each patient was based on parameters mentioned:

antero-posterior malocclusion according to Angle's system of classification, transverse discrepancies and the pre-treatment Peer Assessment Rating (PAR) index. The differences between the pre-treatment and post-treatment PAR scores determined the treatment outcome. The study group consisted of patients with – 10 cases of Down's syndrome, 10 cases of psychomotor deficiency, 10 cases of congenital craniofacial disorders, 5 cases of autistic spectrum disorders, 5 cases of cerebral palsy, 5 cases of sensory deficiencies and 5 cases of rare congenital disorders. This survey was completely based on questionnaires comprising of 20 questions categorised into 4 sections:

- i. **Attitude and cooperation to orthodontic treatment:** Attitude of patients and tolerance of their parents while assisting with oral care during treatment, frequency of tooth brushing, level of patient cooperation during hygiene procedure, adaptation to removable and fixed orthodontic appliances and the treatment effects on the routine activities of life.
- ii. **Advantages from orthodontic treatment:** Increased quality of life, social acceptance level and vitality of aesthetic appearance.
- iii. **Side-effects related to orthodontic treatment:** Altered function, oral lesions, high salivary secretion and nausea.
- iv. **Satisfaction level after orthodontic treatment:** Satisfaction in terms of treatment outcome, improved self-esteem, improved routine life, reaction of family and friends, changes in social life and consent to undergo orthodontic treatment again if required in future.

The parents of 50 normal healthy children (NC) undergoing orthodontic treatment at the orthodontic section of the same hospital and treated by the same orthodontists were established as the control group for the survey. The parameters like age, sex, antero-posterior malocclusion and pre-treatment PAR index scores of the NC group were matched with the SN group and all the patients were treated with both removable and fixed orthodontic appliances.

Table 1: Diagnoses of anteroposterior malocclusion in SN children (n = 50) (Angle's classification system)

Medical Diagnoses	Class I	Class II	Class III
Down's Syndrome	0	1	8
Mental and/or psychomotor deficiency	3	3	5
Congenital malformations with Craniofacial development	1	4	4
Cerebral Palsy	0	5	2
Autism Spectrum Disorders	0	2	2
Sensory deficiencies	1	0	2
Other rare congenital disorders	2	2	3

Table 2: Opinions of parents of SN (n = 50) and NC (n = 50) on attitudes and compliances to appliances during orthodontic treatment.

	SN n(%)	NC n(%)	P value
Patient's attitude			1.000
She/he was particularly motivated during treatment	40 (80%)	44(88%)	
She/he understood the treatment, but was not motivated	5 (10%)	6 (12%)	
She/he did not understand the treatment	5 (10%)	0 (0%)	
Parent's preparation for oral hygiene			< 0.001
Fully prepared	45 (90%)	30 (60.0%)	
Ready to act if necessary	2 (4%)	0 (0%)	
Prepared to guide and encourage caregivers	1 (2%)	0 (0%)	
Not ready	2 (4%)	20 (40 %)	
Daily tooth brushing			0.155
Increased	25 (50.0%)	20 (40%)	
Not increased	22 (44.0%)	27 (54%)	
Number of daily tooth brushings before orthodontic treatment			0.810
Once a day	19 (38%)	20(40%)	
2 to 3 times a day	28 (56%)	30(60%)	
Level of cooperation and collaboration in oral hygiene procedures			< 0.001
High prior to orthodontic treatment	30 (60.0%)	1 (2%)	
High from the start of orthodontic treatment	15 (30%)	9 (18.0%)	
Low	5 (10%)	40 (80%)	
Adaptation to removable appliance*			0.018
She/he did not tolerate the appliance	5 (10%)	0 (0%)	
She/he adapted to the appliance after some time	7 (14%)	3 (6%)	
She/he adapted to the appliance immediately	30 (60%)	46 (92%)	
Adaptation to fixed appliance			0.025
She/he did not tolerate the appliance	2 (4%)	0 (0%)	
She/he adapted to the appliance after some time	3 (6%)	0 (0%)	
She/he adapted to the appliance immediately	45 (90%)	50(100%)	

Most difficult orthodontic phase			< 0.001
Removable phase	10 (20%)	20 (40%)	
Fixed phase	10 (20%)	20 (40%)	
Removable extra oral phase	6 (12%)	10(20%)	
None of the above	24 (48%)	0 (0%)	
Aspects found particularly overwhelming			< 0.001
Insertion of the device each day	5 (10%)	9 (18.0%)	
Taking care of treatment	1 (2%)	0 (0%)	
Maintenance of oral hygiene	20 (40%)	41 (82.0%)	
None of the above	24 (48%)	0 (0%)	

*This question was only answered by parents of special needs and normal children who wore removable appliances (n = 42 and n = 48, respectively).

Table 3: Benefits of orthodontic treatment as perceived by parents of special needs (n = 50) and normal children (n = 50).

	SN n (%)	NC n (%)	P value
You wish to enhance the appearance of the teeth and face			0.220
A lot	40 (80%)	30 (60.0%)	
A little	8 (16%)	12(24%)	
Not concerned	2 (4%)	8 (16%)	
Improvement In quality of life			0.530
Yes	42 (84%)	37 (74%)	
No	2 (4%)	5 (10.0%)	
Don't know	6 (12%)	8 (16%)	
Improvement in social acceptance			0.016
Yes	37 (74%)	28 (56%)	
No	5 (10%)	10 (20%)	
Don't know	8(16%)	12(24%)	
Improvement in social integration			0.006
Yes	33 (66%)	23 (46%)	
No	10 (20%)	5 (10.0%)	
Don't know	7 (14%)	22 (44%)	
Other reasons for seeking treatment			0.002
To improve dental health	32 (64%)	35 (70%)	
To improve chewing	10 (20%)	12 (24%)	
To improve speech	8 (16%)	3(6%)	

The ethical clearance for the study was taken from the Ethical committee of the Multi-specialty hospital in Odisha, India. Written informed consent was taken from the parents or legal guardians of patients from both SN and NC group involved in the study.

Statistical analysis

The statistical analysis for this study was performed using R software, version 2.12.0 (R Development Core Team, Austria). The differences in the responses of parents from both the groups were evaluated using Fisher test with P value < 0.05 considered significant. The differences in the values of quantitative variables between the patients with different medical diagnoses were evaluated using the Kruskal Wallis test.

RESULTS

Diagnosis of orthodontic treatment: The antero-posterior diagnosis in the SN group suggested 25.1% cases as class I, 33.5% cases as class II and the rest as class III. This resulted because of alterations in the maxilla (12% cases), mandible (13% cases) and bimaxillary (75% cases). The transverse changes in occlusion were observed in 50% cases of SN group – unilateral crossbite (21% cases) and bilateral crossbite (29% cases). The mean PAR index score was 30.5 ± 5 (pre-treatment) and 10.5 ± 9 (post-treatment) with a mean difference of 21.5 ± 5 (about $70.0\% \pm 20.1\%$ change). After the treatment was over, 40% amongst SN parents felt that there had been a good improvement, 55% felt considerable improvement, while 5% felt that the treatment didn't bring about much improvement.

No significant difference was found in the distribution pattern of antero-posterior malocclusions or in the pre-treatment PAR index scores between SN and matched NC groups. However, the medical reports of these patients were found to have an impact on the prevalence of antero-posterior malocclusions ($P=0.02$). (Table I)

The attitude and cooperation to orthodontic treatment: As mentioned by the parents, 80% of SN group were motivated during orthodontic treatment. About 88% of SN parents were prepared to render care during orthodontic treatment as against 60% amongst NC parents, 40% of whom

agreed that they were less motivated for orthodontic treatment ($P<0.001$). As many as 50% of SN patients increased their brushing and 56% patients brushed 2-3 times per day. A marked increase of cooperation towards oral hygiene procedures was demonstrated by parents of SN group (about 60%) as against 2% of NC parents with 80% of the NC patients themselves showing poor collaboration in these techniques ($P<0.001$). Adaptation and wearing of the removable appliances was poorer in SN (60%) than NC (92%) group ($P=0.015$) with 10% of SN unable to tolerate orthodontic removable appliances. Acceptance of fixed appliances were excellent in both the groups (90% and 100% respectively). Though 20% of SN parents agreed that they could not point to any particular phase of treatment being more cumbersome than the other stages, 40% of NC parents mentioned the fixed appliance phase to be more cumbersome ($P<0.001$). The oral hygiene maintenance was found to be stressful by 8% of SN parents as against 82% of NC parents ($P<0.001$). These results have been mentioned in Table 2.

Advantages from orthodontic treatment: 80% of SN parents reported an improvement in the quality of life post orthodontic treatment as compared to 60% of NC parents. In terms of social concerns, 84% of SN parents acknowledged the improvement with 74% showing an increased social interaction. The same was suggested by 56% amongst NC parents ($P=0.015$ and 0.005 respectively). This can be explained from the fact that amongst SN parents, 64% had sought an improved oral health and 16% sought to improve speech through orthodontic treatment as against 70% and 3% respectively amongst NC parents ($P=0.002$). The results are mentioned in Table 3.

Side effects related to orthodontic treatment: 60% of SN parents reported of oral lesions during orthodontic treatment but in most cases (26% of SN and 62% of NC), the appliances did not alter oral functions. 18% of SN and 6% of NC reported increased salivation and/or nausea. The results have been mentioned in Table 4.

Satisfaction level after orthodontic treatment: Amongst the SN group, 36% parents reported that they were satisfied with the treatment outcome whereas 60% stated that the outcome exceeded their expectations when compared with 88% and

12% respectively from the NC group ($P < 0.001$). The results particularly exceeded expectations in patients with highest pre-treatment PAR scores ($P = 0.02$) and a huge difference between the pre-treatment and post-treatment PAR scores ($P = 0.03$).

The orthodontic treatment results made the relatives happy in 60% of SN patients compared with 22% of NC patients ($P < 0.001$). They were particularly enthusiastic with the treatment outcome in patients with higher pre-treatment PAR scores ($P = 0.02$), those with huge differences between pre-treatment and post-treatment PAR scores ($P < 0.01$), and those with a highly improved PAR normogram ($P = 0.01$). The parents of the SN group witnessed marked improvement in everyday activities (76%) and social life (60%) as compared to 12% and 6% respectively among the NC group ($P < 0.001$ in both groups). Expectedly, the improvement in everyday activities and social life were more evident in patients with highest pre-treatment PAR scores ($P < 0.01$) and those with greatest differences between pre-treatment and post-treatment PAR scores ($P = 0.02$). When questioned if they would allow their children to undergo similar orthodontic treatments if necessary, in future, 84% of SN and 88% of NC parents answered in positive. The results have been mentioned in **Table 5**.

DISCUSSION

The duration of orthodontic treatment is much higher among the SN group because of the complexity of malocclusions present in them with a need for temporary removal of appliances sometimes. Motivation, in this regard, is very crucial for an increased cooperation.^{16,17} In SN patients, the motivation depends upon the presence of discomfort and degree of acceptance, but is still lower than that of their parents. Thus, SN patients receive a greater cooperation from their parents.¹⁸⁻²⁰ On the contrary, 80% of NC parents mentioned that the level of cooperation was less. Some authors consider the fact that SN patients demonstrate an inability in performing proper oral hygiene as a drawback.²¹⁻²³ Thus, the frequency of tooth brushing both pre- and during orthodontic treatment are similar in the two groups.

Majority of parents in NC reported of less discomfort with removable appliances than fixed

appliances with a greater cooperation required during the fixed phase. Some authors have previously mentioned that patients with intellectual disability tolerate fixed appliances better and our findings have coincided with the previous findings. According to a previous study by Becker et al, difficulty in maintaining oral hygiene and monitoring treatment are most common problems in managing SN patients.²³⁻²⁵ Our study, however, observed that the maintenance of oral hygiene was more stressful in NC patients than SN patients as their parents actively participated in the maintenance of oral hygiene of their children and this also explained the fact that they did not find any particular phase of orthodontic treatment a problem. It has also been observed that amongst NC group 90% patients and parents desire an improved aesthetic result with orthodontic treatment.²⁶⁻²⁷ In our study, however, we did not find statistically significant differences between NC and SN parents for whom improving the facial appearance of the child was important in seeking treatment.

Surveys conducted among healthy children undergoing orthodontic treatment reveal that both the patients and parents give psychosocial concerns the importance in terms of the desired treatment outcome.^{28,29} An improved physical appearance along with oral functions is more important among SN group. Becker et al had previously suggested that orthodontic treatment is important among SN patients for improved masticatory functions, speech and control of drooling in adjunct with an improved facial appearance.³⁰ In the present study, parents requested for orthodontic treatment to improve orofacial function and speech improvement among NC group. The orthodontic treatment is known to be associated with oral lesions, gingival inflammation, ulceration and contusion, especially between 6 and 18 years.³¹⁻³³ In SN group, especially patients diagnosed with Down's syndrome ulcers are the most commonly associated complication during orthodontic treatment. In this present study, 50% amongst NC patients and 60% of SN patients reported of oral lesions. The patient motivation can be greatly improved by maintaining a good oral hygiene and preventing these lesions without pain and discomfort. Stewart et al reported that speech and swallowing disturbances appear in patients while using removable appliances and may persist for months after treatment.^{34,35} In our study, both

the SN group (75%) and NC group (85%) confirmed that their oral functions did not alter with orthodontic treatment.

Previous study by Becker et al on adolescents have revealed that almost 100% parents were satisfied with the treatment results with 11% even claiming to have obtained results exceeding their expectations.³⁶ In our study, 90% of SN parents were satisfied, with 40% claiming to have obtained results exceeding expectations. We have observed that the perception of improvement in social activities and life was much higher among SN than NC which led to an increased self-confidence and their parents even consented to allowing further orthodontic treatments if deemed necessary in future.

The limitations of this study that should be taken into consideration is that the characteristics of SN group were obtained through a questionnaire survey and hence their opinions on motivation may have been a bit exaggerated. Also, the PAR index score impacted a few responses during the survey, especially the ones relating to satisfaction and appreciation of results and severe malocclusions requiring surgical corrections had been excluded from the survey. Thus, with higher PAR scores, whether their responses would have varied can be debated. Finally, the functional variables such as those associated with routine activities from the survey were evaluated along a qualitative basis and an objective assessment may be taken

CONCLUSION

The results of this survey showed that the parents of SN group undergoing orthodontic treatment are more motivated and willing to cooperate in the oral hygiene procedures than the NC group. Furthermore, the orthodontic treatment can produce an improvement in the quality of life, oral function and social relationships of SN group. The perceived level of satisfaction is usually very high and the parents of these children maintain that they would prefer further orthodontic treatment if needed in the future.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. American Dental Association. Council on Dental Education: Find a Dentist: Specialty Definition (adopted April 2003). Accessed 10 January 2014.
2. Dinesh Rao B, Arnitha Hedge M, Munshi AK: Malocclusion and orthodontic treatment need of handicapped individuals in South Canara, India. *Int Dent J* 2003, 53:13-18.
3. Winter K, Baccaglini L, Tomar S: A review of malocclusion among individuals with mental and physical disabilities. *Spec Care Dent* 2008, 28:19-26.
4. Watson N. Barriers, discrimination and prejudice. In: Nunn J, editor. *Disability and Oral Care*. London: World Dental Press Ltd.; 2000. pp. 15-28.
5. Waldman HB, Perlman SP, Swerdloff M: Orthodontics and the population with special needs. *Am J Orthod Dentofacial Orthop* 2000, 118:14-17.
6. Hobson RS, Nunn JH, Cozman I: Orthodontic management of orofacial problems in young people with impairments: review of the literature and case reports. *Int J Ped Dent* 2005, 15:355-363.
7. Johnson M, Harkness M. Prevalence of malocclusion and orthodontic treatment need in 10-year-old New Zealand children. *Aust Orthod J*. 2000;16:1-8.
8. Kleint G, Kanitz G, Harzer W: Orthodontic treatment in handicapped children: report of four cases. *J Dent Child* 2002, 69:31-38.
9. Becker A, Shapira J: Orthodontic for the handicapped child. *Eur J Orthod* 1996, 18:55-67.
10. Chadwick SM, Asher-McDade C: The orthodontic management of patients with profound learning disability. *Br J Orthod* 1997, 24:117-125.
11. Outumuro M, Abeleira MT, Caamaño F, Limeres J, Suarez D, Diz P, Tomás I: Maxillary expansion

- therapy in children with down syndrome. *Ped Dent* 2010, 32:499-504.
12. Pratelli P, Gelbier S, Gibbons DE: Parental perception and attitudes on orthodontic care. *Br J Orthod* 1998, 25:41-46.
13. Atassi F, Awartani F: Oral hygiene status among orthodontic patients. *J Contemp Dent Pract* 2010, 11:25-32.
14. Feldmann I: Satisfaction with orthodontic treatment outcome. *Angle Orthod* 2014.
15. Anderson LE, Arruda A, Inglehart MR: Adolescent patients' treatment motivation and satisfaction with orthodontic treatment: do possible selves matter? *Angle Orthod* 2009, 79:821-827.
16. Al-Sarheed M, Raman B, Nigel PH: The views and attitudes of parents of children with sensory impairment towards orthodontic care. *Eur J Orthod* 2004, 26:87-91.
17. Adam SD, Jason D, Inglehart MS, Inglehart MR: Orthodontic treatment motivation and cooperation: a cross-sectional analysis of adolescent patients' and patients' responses. *Am J Orthod Dentofacial Orthop* 2009, 136:780-787.
18. Daniels AS, Seacat JD, Inglehart MR: Orthodontic treatment motivation and cooperation: a cross-sectional analysis of adolescent patients' and patients' responses. *Am J Orthod Dentofacial Orthop* 2009, 136:780-787.
19. Trulsson U, Klingberg G: Living with a child with a severe orofacial handicap: experiences from the perspectives of parents. *Eur J Oral Sci* 2003, 111:19-25.
20. Birkeland K, Boe OE, Wisth PJ: Relationship between occlusion and satisfaction with dental appearance in orthodontically treated and untreated groups: a longitudinal study. *Eur J Orthod* 2000, 22:509-518.
21. Bhambal A, Jain M, Saxena S, Kothari S: Oral health preventive protocol for mentally disabled subjects - A review. *J Adv Dent Res*. 2011;2:21-6.
22. Baricevic M, Mravak-Stipetic M, Majstorovic M, Baranovic M, Baranovic D, Loncar B: Oral mucosal lesions during orthodontic treatment. *Int J Paed Dent* 2011, 21:96-102.
23. Becker A, Shapira J, Chaushu S: Orthodontic treatment for disabled children: motivation, expectation and satisfaction. *Eur J Orthod* 2000, 22:151-158.
24. Becker A, Shapira J, Chaushu S: Orthodontic treatment for the special needs child. *Progr Orthod* 2009, 10:34-47.
25. Chaushu S, Becker A: Behaviour management needs for orthodontic treatment of children with disabilities. *Eur J Orthod* 2000, 22:143-149.
26. Borzabadi-Farahani A, Borzabadi-Farahani A: Agreement between the index of complexity, outcome, and need and the dental and aesthetic components of the index of orthodontic treatment need. *Am J Orthod Dentofacial Orthop*. 2011;140:233-8.
27. Purohit BM, Acharya S, Bhat M: Oral health status and treatment needs of children attending special schools in South India: A comparative study. *Spec Care Dentist*. 2010;30:235-41.
28. Onyeaso CO: Orthodontic treatment need of mentally handicapped children in Ibadan, Nigeria, according to the dental aesthetic index. *J Dent Child (Chic)* 2003;70:159-63.
29. Chauhan D, Sachdev V, Chauhan T, Gupta KK: A study of malocclusion and orthodontic treatment needs according to dental aesthetic index among school children of a hilly state of India. *J Int Soc Prev Community Dent*. 2013;3:32-7.
30. Becker A, Shapira J, Chaushu S: Orthodontic treatment for disabled children-a survey of patient and appliance management. *J Orthod* 2001, 28:39-44.
31. Guidelines for Evaluation of Various Disabilities and Procedure for Certification. Expert Committees, Under the Chairmanship of Director General Health Services (DGHS), Vide

- Notification No. 16-18/97-NI I; dated 1st June, 2001.
32. Oliveira AC, Paiva SM, Martins MT, Torres CS, Pordeus IA. Prevalence and determinant factors of malocclusion in children with special needs. *Eur J Orthod*. 2011;33:413-8.
 33. Stewart FN, Kerr WJ, Taylor JS: Appliance wear: the patient's point of view. *Eur J Orthod* 1997, 19:377-382.
 34. Borzabadi-Farahani A. An insight into four orthodontic treatment need indices. *Prog Orthod*. 2011;12:132-42.
 35. Daniels C, Richmond S. The development of the index of complexity, outcome and need (ICON) *J Orthod*. 2000;27:149-6.