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Oral Health Related Quality of Life (OHRQoL) amongst Patients Wearing Fixed Orthodontic Appliance in Pimpri, Pune, India - A Cross Sectional Study

Qualidade de Vida Relacionada à Saúde Bucal (OHRQoL) em Pacientes Usando Aparelho Ortodôntico Fixo em Pimpri, Pune, Índia - Um Estudo Transversal

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ABSTRACT

Objective: To assess the prevalence of oral impacts on daily performances and influence of grades of malocclusion on OHRQoL in patients wearing fixed orthodontic appliance, and to assess the other potential factors (Gender, Socio-economic status, wiring technique of appliance, Operator choice) which are influencing the oral impacts in patients with fixed orthodontic appliance.

Methods: 130 participants, 14-22 years old, were selected by convenience sampling from the Department of Orthodontics and Dentofacial Orthopedics of the Dental College, Pune and from three private practitioners. Only those wearing fixed orthodontic appliances since the past 6 months were included. Face to face structured interviews were conducted to collect information about impacts, using the Oral Impact on Daily Performances (OIDP). Pre-treatment casts of participants were examined to record the malocclusion status using Index of complexity, outcome and need (ICON). Comparison was done between OIDP and ICON scores, and other co-variables.

Results: The prevalence of oral impacts was 86.92%. 55.35% of the participants had an impact on three or more daily performances, commonly eating, social contact, cleaning teeth, speaking (78.46%, 51.53%, 45.38%, and 40.76% respectively). Only ICON scores had an influence on OIDP scores ($P < 0.05$).

Conclusion: Severity of malocclusion has great impact on OHRQoL during fixed orthodontic treatment.

RESUMO

Objetivo: Avaliar a prevalência de impactos bucais no desempenho diário e a influência da gravidade da má oclusão na qualidade de vida relacionada à saúde bucal em pacientes usando aparelho fixo ortodôntico e avaliar os outros fatores potenciais (sexo, status sócio-econômico, técnica de construção do aparelho, escolha do operador), que influenciam o impacto odontológico em pacientes com aparelho ortodôntico fixo.

Método: 130 participantes, de 14 a 22 anos de idade, foram selecionados por amostragem de conveniência, no Departamento de Ortodontia e Ortopedia Facial da Faculdade de Odontologia, Pune e em três consultórios privados. Apenas aqueles que utilizavam aparelhos ortodônticos fixos há pelo menos seis meses foram incluídos. Entrevistas face a face estruturadas foram conduzidas para coletar informações sobre os impactos, usando o Impacto Odontológico no Desempenho Diário, (OIDP). Modelos da fase pré-tratamento dos participantes foram avaliados para registrar a condição da má oclusão por meio do Índice de complexidade, resultado e necessidade (ICON). A comparação foi realizada entre os escores do OIDP e do ICON e outras co-variáveis.

Resultados: A prevalência de impactos oral foi 86,92%. 55,35% dos participantes apresentaram um impacto em três ou mais desempenhos diários, comendo frequentemente, contato social, limpando os dentes, falando (78,46%, 51,53%, 45,38% e 40,76%, respectivamente). Apenas os escores do ICON influenciaram nos escores do OIDP ($p < 0,05$).

Conclusão: A gravidade da má oclusão tem grande impacto sobre a qualidade de vida relacionada à saúde bucal durante o tratamento ortodôntico fixo.

KEY-WORDS

Oral health; Quality of life; Orthodontics, Corrective.

DESCRIPTORES

Saúde bucal; Qualidade de vida; Ortodontia corretiva.

INTRODUCTION

Good oral health, should no longer merely be seen as the absence of caries or periodontal disease or malocclusion etc., patients mental and social well-being should be considered as well¹. The concept of “Oral Health related quality of life”(OHRQoL) captures the aim of this new perspective. It has main goal to challenge clinicians as well as researchers to make OHRQoL the ultimate focus of all their work¹.

Quality of life, as usually applied in health outcome research, is a multidimensional concept that includes subjectively perceived physical, physiological and social functions as a sense of subjective well being¹. The scope of subjective indices, therefore, has been widely extended to cover physical, psychological and social aspects of daily functioning². This also applies to research in the association of quality of life and malocclusion and its treatment as well².

To fully evaluate any healthcare intervention as fixed orthodontic treatment, it requires outcome measures that are of importance to patient, as well as the clinician³. Such a measure is a useful way of highlighting problems that patient experience⁴.

Previously studies have been done to evaluate the influence of grades of malocclusion on OHRQoL before treatment^{6,7,8,9}. Many studies have assessed the experiences of pain and discomfort among orthodontic patient during the progression of treatment^{4,10,11,12,13}. But there is lack of data regarding the influence of grades of malocclusion on OHRQoL during fixed orthodontic therapy. Therefore the present study had the objective of assessing the prevalence of impacts and Influence of grades of malocclusion and potential confounding factors on OHRQoL in patients wearing fixed orthodontic appliance for at least past 6 months in Pimpri, Pune, India.

METHODOLOGY

This study was conducted in Pimpri city which is an industrial belt of state of Maharashtra (India) with a population of 1,006,417 of Pimpri-Chinchwad township. The oral health care in Pimpri comprises of one private dental college-Hospital and approximately 125 private dental clinics. In order to explore data regarding OHRQoL during fixed orthodontic treatment in importance to both operator and patient who is seeking fixed orthodontic treatment, the study was conducted which involved patients from both Hospital and clinical settings at Pimpri.

130 participants, aged 14-22 years, wearing fixed orthodontic appliance since at least past 6 months were selected by convenience sampling from Department of Orthodontics and Dentofacial Orthopedics, Dr. D.Y.Patil Dental College and Hospital, Pune, India and three private practitioners to whom

investigator had an access. Those who gave consent for the study were interviewed to know the impact of fixed appliance on daily performances in the past 6 months. Patients those who were referred from other speciality dental branches (Prothodontics, Periodontics etc.) for fixed orthodontic treatment were excluded. Ethical approval was obtained from the Ethics Committee of the Dr. D.Y.Patil University Pune.

Sample size was derived by conducting a Pilot study involving 75 participants. Considering 80% power, with alpha error 5% (2 sided) the minimum required sample size was estimated to be 121. Including participants from pilot study, the final number of participants involved in the study was 130.

Information about socio-demographic characteristics i.e. age, gender, socio-economic status (Kuppuswamy's Classification)¹⁴ was collected while interviewing participants. The impact of fixed orthodontic appliance on daily performances was collected using OIDP index through face to face structured interview. They were interviewed for eight domains related to daily performances namely eating, cleaning teeth, speaking, smiling, sleeping, studying or working, and social contact and emotional stability. Participants were asked for impact on each domain, if they said yes, they were asked to rate the frequency scale ranging from 1 to 5² and severity scale, Likert scale ranging from 0-5².

OIDP index^{1,2,4} was modified for its linguistic and cultural adaptation to the local Indian setting using the back-translation method. Face validity was evaluated from expert panel of orthodontists and test retest reliability of the OIDP was tested on 10 participants (not included in study sample) (inter-rated Kappa 0.77), as the reliability was found to be good, the OIDP index was used for study sample.

For assessing the severity of malocclusion pre-treatment casts of all participants were examined to record ICON¹⁵. Investigator was blinded while examining casts. The investigator underwent training for the use of ICON in the Department of Orthodontics and Dentofacial Orthopedics, In order to obtain accuracy and consistency in the use of the ICON the calibration exercise was carried out in the Department of Public Health Dentistry (Intraclass correlation 0.98).

Additional Information about the potential confounders, operator (post graduate or professional) who is carrying out the treatment and wiring method used for fixed orthodontic appliance was also collected from the respective operator of each participant.

The OIDP score for each participant was derived by multiplying the corresponding frequency and severity scores for each of eight domains. And these scores of each domain were summed up to derive the overall OIDP score of an individual (overall OIDP for an individual ranging from 0-200).

Pre-treatment casts were examined by investigator for each of five components of ICON, Dental Aesthetic, Anterior-vertical relationship, Upper arch crowding or spacing, crossbite, buccal segment anterior posterior

relationship and scoring was given according to the protocol for each occlusal trait scoring, final score was derived and interpretation of final score was done to obtain complexity grade¹⁵.

Data analysis was carried out using the SPSS 15. Before analysis of data, distribution of OIDP and ICON scores was tested using Kolmogorov-Smirnov test. Both OIDP scores and ICON scores were non-normal, therefore Non-parametric tests were used for statistical analysis of the data.

RESULTS

130 participants (f=69 and m=61) were included in the study. Out of these 130 participants; 27, 52, 30 and 21 participants were from Upper, upper middle, upper lower and lower middle social class respectively. According to the grade of complexity (ICON categories); 1, 45, 67, 12, and 5 participants were from easy, mild, moderate, difficult and very difficult category respectively. 60 cases of these participants were treated by post-graduate students and 70 cases were treated by professionals. Of these 130 participants; 120 participants were wearing Beggs appliance and 10 participants were wearing edgewise appliance.

The prevalence of impacts on daily

performances attributed to fixed orthodontic treatment was 86.92% (when overall OIDP >0) (Table 1A). Eating, social contact, cleaning teeth and speaking were the daily performances which were commonly affected; 78.46% and 51.53%, 45.30% and 40.76 respectively. Studying, Emotional stability, smiling and sleeping were the least affected performances; 13.84%, 27.69%, 29.23%, 35.38 respectively (Table 1A). There was association between OIDP and ICON ($P < 0.05$) and no association was found between OIDP and other co-variables ($P > 0.05$) (Table 1B).

There was no statistically significant difference in overall OIDP score when compared with co-variables like gender, SES, wiring technique of fixed appliance and operator (post graduate student or professional ($p > 0.05$)). There was statistically significant difference in overall OIDP scores and ICON categories ($P = 0.000$) (Table 2). In relation to the extent of impacts; 14.61 % reported 1 affected performance, 16.92% reported 2 affected performances, and 55.35% participants reported 3 or more affected performances.

There was no statistically significant difference in the extent of impacts by gender, SES, operator, and wiring technique ($P > 0.05$). However, there was a statistically significant difference when the extent of impact was compared by ICON categories ($P = 0.000$) (Table 2).

Table 1. Prevalence of performances affected, mean frequency and severity attributed to wearing fixed orthodontic appliance

	Q ₁ eating	Q ₂ cleaning teeth)	Q ₃ (Speaking)	Q ₄ (smiling)	Q ₅ (sleeping)	Q ₆ (studying)	Q ₇ (social contact)	Q ₈ (emotion al stability)	Overall impact
Prevalence of impacts(n=1 30)	78.46%	45.38%	40.76%	29.23%	35.38%	13.84%	51.53%	27.69%	86.92% n=113
Frequency Mean(SD) (n=113)	2.05 (0.99)	1.67 (0.57)	1.98 (0.82)	2.5 (0.89)	1.73 (0.68)	1.72 (0.82)	2.31 (1.42)	1.52 (0.97)	1.69
Severity Mean (SD)(n=113)	1.76 (0.98)	1.48 (0.56)	1.69 (0.94)	1.81 (1.06)	1.36 (0.53)	1.21 (0.41)	1.44 (0.61)	1.27 (0.51)	1.52

Table 1:B

Association between OIDP, ICON and other variables when adjusted using binary logistic regression

Variables	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
			Lower	Upper
ICON	.010*	1.092	1.021	1.168
Beggs bracket system	.865	1.220	0.123	12.072
SES	.814			
SES II	.745	1.305	.262	6.497
SES III	.348	2.037	.461	9.005
SES IV	.596	1.548	.308	7.784
Operator post graduate student	.514	.688	224	2.113
Gender female	.824	1.130	384	3.326
Constant	.160	0.044		

* Statistically significant difference $P < 0.05$

Table 2. The comparison of OIDP scores and extent of impact attributed to fixed orthodontic appliance according to co-variables.

Co-variables		n	OIDP scores				Extent of impact(no. of performances affected)			
			Mean OIDP	SD	Median	p value	mean extent	SD	Median	p value
Gender	Female	69	11.97	12.56	7.00	.149 ^a	3.53	2.23	4.00	.073 ^a
	Male	61	9.09	10.69	4.00		2.86	2.32	2.00	
SES	Upper	27	8.23	11.49	4.00	.383 ^b	2.88	2.30	2.00	.418 ^b
	Upper middle	52	10.40	10.60	6.00		3.42	2.23	3.00	
	Upper lower	30	12.86	13.77	7.00		3.50	2.35	4.00	
	Lower middle	21	8.40	8.23	4.00		2.76	2.34	4.00	
Operator	P.G. student	60	12.21	13.16	7.00	.308 ^a	3.43	2.38	3.00	.360 ^a
	Professional	70	9.25	10.31	4.00		3.04	3.00	2.20	
Bracket system	Edgewise	120	10.51	11.73	5.50	.617 ^a	3.20	2.30	3.00	.628 ^a
	Beggs	10	11.90	12.71	7.50		3.50	2.17	3.50	
ICON	Easy	1	0.00	-	.00	.000 ^{b*}	.00	-	.00	.000 ^{b*}
	Mild	45	5.42	7.19	3.00		2.51	1.90	2.00	
	Moderate	67	9.41	9.37	7.00		2.97	2.09	3.00	
	Difficult	12	26.00	10.92	27.50		6.25	1.48	7.00	
	Very difficult	5	38.80	7.56	39.00		6.40	1.14	6.00	

^a Test applied for co- variables gender, operator, bracket system : Man Whitney U Test^b Test applied for co-variable SES and ICON: Kruskal Wallis test

*Statistically significant difference between pairs P< 0.05

DISCUSSION

This study was an assessment of how fixed orthodontic appliance therapy impacts the OHRQoL.

The study involved 130 participants, aged 14-22 years; most of the high school children and graduates were interviewed in the Hospital where they received treatment. Most of the participants were from upper middle (n=52) and upper lower class (n=30). As the treatment charges in the Hospital were subsidized, number of these participants seeking treatment from the Hospital was high. Only 27 participants were from the upper class, most of them were interviewed at private clinics, as they can afford treatment there. 21 participants were from lower class. Probably the lower class could not afford the treatment even at subsidized charges and hence the number of these patients seeking the treatment was low.

Most of the participants were belonging to the moderate category (n=67) of the ICON. Data regarding wiring technique of the fixed orthodontic appliance and the operator carrying out the treatment (post graduate student or professional) was also collected in order to study the potential effect of variables. 120 out of 130 participants were wearing appliance with edgewise technique, as it is less time consuming and pre adjusted, and has advantages over Beggs technique.

In this study, prevalence of impact on daily performances due to fixed orthodontic appliance was

found to be 86.92%. Eating, social contact, cleaning teeth and speaking were the daily performances most commonly affected (78.46%, 51.53%, 45.38%, and 40.76% respectively). This study findings match with others studies^{4,10,11,16}.

Eating, speaking, and smiling were daily performances most commonly affected⁴ and the main short and long-term impacts of wearing appliances were on speech, swallowing and social contact¹⁰. In a follow up study was verify that impact such as functional limitation, oral hygiene impact and impacts related to aesthetics did not reduce over time¹¹, this finding match with present study as even after first six months patients reported impact on functional performances (eating, cleaning teeth, speaking). The impact on social well-being was the most commonly and severely affected even after 6 months of fixed appliance therapy¹⁶. The reason for pain or discomfort while performing functional activities like eating, speaking, cleaning teeth might be due to the fact that the fixed orthodontic appliance is there in the mouth until the patient is undergoing treatment, or could be due to the fact that pain and discomfort related to functional performances do not diminish with time as appliance is regularly adjusted. This study findings confirms that oral functions and social contact is most commonly affected during fixed orthodontic treatment.

When social contact or social well-being was concerned findings of this study differ from a previous study⁴ that found that social contact was not affected at all and other one¹⁷ that concluded that social well-being was less compromised during treatment which is likely to

be related to widespread use of orthodontic services and social acceptance of malocclusion treatment. In the present study social contact was the second most affected performance and it might be because of social and cultural backgrounds in the developing country like India that has influence on dental behaviour¹⁸. Participants in the present study were from young age group, as youngsters tend to be more concerned about their appearance, they might be vulnerable to feeling of shame and negative self-regard of their own physical appearance this might be the another reason why the social contact was second most commonly affected performance in this study.

In this study performances such as sleeping, smiling, emotional stability and studying or working were less commonly affected (35.38%, 29.23, 27.69, 13.84 respectively); and the reason might be adaptation to treatment, or learned experience of treatment over a period of time, this finding of the study supports previous finding^{4,16,17}. An improvement in emotional well-being when compared with pre-treatment, subjects reported greater emotional well-being improvement during three to six months of treatment¹⁷. With the progression of treatment the emotional well-being was less compromised. In this study emotional well-being was less compromised which might have improved over a period of 6 months of the treatment¹⁷.

It was found that no co-variable other than ICON score had an influence on OIDP score ($P < 0.05$) i.e. the impact was found to be high (High OIDP scores) in participants with high ICON scores. This indicates that the impact on daily performances was high in patients with severe malocclusion. As there is a scarcity of data in this regard, further studies are needed to confirm this finding. Where co-variable gender was concerned findings from the present study supports the finding by other studies^{4,11} that found that there was no influence of gender on the impact of fixed appliances on daily life. This finding differs from others^{19,20}. Present study supports findings by other study¹¹ that concluded that socioeconomic background generally did not influence the impact of fixed appliances on daily life. A previous study⁶ found that SES has influence on intensity of impacts related to fixed orthodontic appliance which contradicts the finding from this study. Wiring technique had no influence on OIDP scores, which confirms the previous findings²¹ that little or no correlation exists between the degree of pain response and applied force magnitude.

None of the co-variables other than ICON score had an influence on the extent of impacts (no of performances affected) ($P < 0.05$). Since there is little literature for us to compare with other studies, further studies need to be done in this area.

Grade of malocclusion was considered as a proxy to the complexity component of ICON in the present study. ICON was used in the present study rather than using IOTN or DAI as the ICON gives the Aesthetic

and Complexity of the malocclusion. For assessing OHRQoL specific measure (OIDP) was used because the focus of specific measure makes patient potentially more responsive to small but clinically important changes in health¹.

As it was a cross-sectional study it had its own limitations, which could not record changes that happens over a period of time. Participants, who were available in the hospital or at the clinic were interviewed during the study which led to convenience sampling. The sample size proved to be adequate, having appropriate sample power to identify statistical difference.

This study found that the pain and discomfort is more likely to be there in those with severe malocclusion, However further studies are needed to confirm this finding. The potential side effects of fixed orthodontic therapy, including the most common sociodental impact on daily living, should be discussed with patient. It should also include explanation of severity of malocclusion and treatment need as motivating stimulus and discussion of effect of non-compliance on existing condition before patients give informed consent to treatment. Patient should be helped in establishing sense of personal control over treatment progression and prepared for encountering discomfort during treatment.

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