

## Original Research

### Evaluation of Quality of Life in Young Population of Indore-Malwa Region Based On Malocclusion and Common Oral Pathosis

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#### **ABSTRACT:**

This in-vivo, retrospective, non-randomized and comparative study was carried out in College of Dental Science and Hospital, Rau, Indore on 430 subjects for 1 year to assess the quality of life in young population of Indore-Malwa region. This study aims to promote awareness among people regarding orthodontic treatment and association of malocclusion with other oral diseases. Statistical analysis included One-way ANOVA with Post-hoc Tukey test for comparison of mean parametric values and Kruskal-Wallis test for nonparametric data. Mean and proportional comparisons were done using Z test. Logistic regression test was done to find out impact of variables on outcome. The results obtained showed an interrelationship between malocclusion and other common oral pathosis along with psychological domain of OHIP-14 questionnaire.

**Key words:** Young, Malocclusion, Oral Pathosis & Malwa.

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#### **INTRODUCTION**

Quality of life is the product of the interplay among social, health, economic and environmental conditions which affect human and social development. Similarly, even oral conditions are supposed to have an impact on the individual's psychological, social and functional aspects referred to as oral-health related quality of life (OHRQoL)<sup>1</sup>. It is also affected by socioeconomic status of an individual and demography. It has been accepted as an essential component of oral health surveys, clinical trials and other studies in evaluating outcomes of

preventive and therapeutic programs intended to improve oral health<sup>2</sup>. Traditionally, oral health epidemiology studies have predominantly measured clinical oral conditions, such as dental caries and periodontal diseases to determine a patient's community periodontal index (CPI) and decayed missing and filled teeth (DMFT) index<sup>3</sup>. However, there also exists an interrelationship between quality of life and malocclusion as well as its treatment and this is important for the clinicians and patients seeking treatment<sup>4</sup>.

Primarily the main reason to seek orthodontic treatment is to obtain improvement in esthetics and subsequent enhancement of psychosocial well-being that might contribute to a better quality of life<sup>5</sup>. Many studies have been conducted associating orthodontic treatment with discomfort and pain while a few have focused on how the orthodontic treatment affect quality of life<sup>6</sup>. In this study indices such as DMFT, CPITN, IOTN-DHC and modified Helkimo Index based questionnaire will be used along with a standardized questionnaire OHIP-14. The Oral Health Impact profile (OHIP-14) is a 14 items questionnaire designed to measure self-reported functional limitation, discomfort and disability attributed to oral conditions, it is derived from an original extended version of 49-items based on theoretical models developed by WHO and adapted for oral health by Locker. In this model the consequences of oral diseases are hierarchically linked from a biological level (impairment) to a behavioral level (functional limitation, discomfort and disability) and lastly to the social level<sup>7</sup>. This study aims to assess the association between malocclusion and oral health - related quality of life in young adults without orthodontic treatment, controlling for socio-demographic factors and common oral diseases. This study benefits by promoting awareness among people regarding orthodontic treatment as this explains association of other oral diseases with malocclusion. It helps clinical practitioners in selecting treatments and monitoring patient outcomes. It will help researchers in identifying determinants of health, tracking levels of health risk factors, and determining use of services in populations.

## MATERIAL & METHODS

### Materials:

1. OHIP-14 & modified Helkimo's Anamnestic based questionnaire (English & Hindi translation.)
2. CPITN probe
3. Diagnostic instruments for clinical examination

### METHODS:

The study was carried out on Indore-Malwa population of about 473 subjects in a time period of 1 year. Data was collected through both face to face interviews and clinical examinations in general outpatient department in College of Dental Science and Hospital, Rau, Indore. Subjects of central India-malwa region (residing from at least two generations in this region) and from 18-25 years of age were included. Patients with serious medical conditions for which they had been hospitalized in past 3 months or patients taking medicines, individuals with current or history of orthodontic treatment or orthognathic surgery, severe dentofacial anomalies such as cleft lip and palate and syndromic patients were excluded from the study.

73 subjects were not willing to give consent for study, so they were excluded. Data was collected till 400 questionnaires was filled and duly consent was given. For the double determination, clinical examination was

conducted on 30 individuals which were not the part of study. Sample was randomly selected and re-examined after 2-week interval of the first examination. The kappa value was 0.81. During interview patient provided information on sociodemographics including age, sex and educational level. OHRQoL were assessed using standardized OHIP-14 questionnaire.

In clinical assessment, dentition status was evaluated using the WHO criteria for DMFT, and periodontal status using CPI and orthodontic treatment need using IOTN-DHC. The presence and severity of signs and symptoms of temporomandibular disorders (TMD), were detected using a questionnaire, composed of questions regarding common TMD symptoms, based on the Modified Helkimo's anamnestic index. Oral soft tissues diseases included burning mouth syndrome, dry mouth, recurrent aphthous stomatitis, angular stomatitis and herpetic gingivostomatitis of oral mucosa. Pericoronitis of the wisdom teeth was included if soft tissue surrounded exhibited inflammation and mild to moderate pain. Clinical assessment of malocclusion and oral disease were performed.

### RESULTS:

Data was obtained from 400 subjects who have given consent, underwent clinical examination and filled OHIP-14 questionnaire (**Table I**). The results show that the malocclusion is mostly affected by psychological discomfort domain of OHIP-14 questionnaire (**Table II and III**).

Further it was seen that, missing teeth (MT), shows highly significant relation with all grades of malocclusion with p value of 0.002. A significant relation occurs with filled teeth (FT), with p value of 0.0014. A highly significant relation of CPI score with grades of malocclusion was also found, with a p value of 0.000. A non-significant relation was found between various grades of malocclusion with soft tissue disease, temporomandibular diseases and decayed teeth (DT). A highly significant correlation was found in between all grades of malocclusion and OHIP-14 questions with a p value of 0.001 (**Table IV**).

Also, decayed (DT) and missing teeth (MT) do not show any correlation with each other while both DT and MT have a correlation with filled teeth (FT), having p value of -0.257 and -0.138 respectively, which is highly significant. DMFT are also correlated to various domains of OHIP-14 questionnaire, although individually they show correlation with different questions categorized under different domains. DT affects psychological discomfort domain showing significant correlation (p value 0.113) with question 6 of the questionnaire, MT shows significant correlation with question 1 (p value 0.114), 3 (p value 0.101), 5 (p value 0.121), 7 (p value 0.102), 9 (p value 0.115), and 10 (highly significant p value 0.144), which are under the domain functional limitation, physical pain, psychological discomfort, physical disability and psychological disability respectively. Highly significant correlation was found with psychological disability domain (**Table V**).

FT was significantly correlated to questions 1-14 except for question 5, hence depicting correlation with all the domains of OHIP-14 questionnaire. Highly significant correlation was found with functional limitation, physical pain, physical disability, psychological disability, social disability and handicap domain (Table V).

DMFT did not show any correlation with either soft tissue disease, or temporomandibular diseases. CPI score was significantly correlated to MT (p value 0.104), FT (p value highly significant 0.154), and all 14 questions of OHIP-14 (p value shown in Table V), questionnaire thereby explaining the correlation with all domains of the same. A significant relation was also found with temporomandibular relation (p value -0.105), while no correlation was found with soft tissue diseases (p value -0.015).

Soft tissue disease affects physical pain domain showing a highly significant correlation (p value -0.141 and -0.127). It is also correlated to temporomandibular diseases (p value 0.224), while it does not have any correlation with DMFT and CPI score. Temporomandibular disease shows significant correlation with all domains of OHIP-14 questionnaire (p value - shown in Table V).

S. No	Variable	Value
1	Sex %	
1a	Male	159 (39.8)
1b	Female	241 (60.2)
2	Age (y), Mean (SD)	21.0 (2.1)
3	Education level, n (%)	
3a	Up to secondary education	105 (26.3)
3b	Postsecondary education	295 (3.7)
4	Common oral diseases	
4a	DT	1.48 (1.05)
4b	MT	1.17 (0.50)
4c	FT	1.70 (1.07)
5	Periodontal health status (CPI) n %	
5a	CPI score < 3	89 (22.3)
5b	CPI score > 3	311 (7.7)
6	TMD, n (%)	
6a	No	308 (77.0)
6b	Yes	92 (23.0)
7	Soft tissue diseases, n (%)	
7a	No	294 (73.5)
7b	Yes	106 (24.5)

Table I: Socio-demographic characteristics and common oral diseases. (n=400)

OHIP-14	Mean (SD)	Distribution					Range
		0	1	2	3	4	
1	2.35 (1.15)	119	105	110	50	16	0-4
2	2.05 (1.01)	145	138	77	34	6	0-4
3	2.40 (1.10)	108	99	130	53	10	0-4
4	2.35 (1.09)	110	110	123	45	12	0-4
5	3.07(1.35)	70	71	89	101	69	0-4
6	2.83 (1.27)	77	84	118	73	48	0-4
7	2.33 (1.10)	116	107	118	49	10	0-4
8	2.15 (1.05)	137	114	116	20	13	0-4
9	2.41 (1.14)	111	102	112	63	12	0-4
10	2.73 (1.42)	109	72	88	89	42	0-4
11	2.24 (1.15)	133	118	84	51	14	0-4
12	2.30 (1.16)	127	109	100	47	17	0-4
13	2.59 (1.34)	115	94	73	78	40	0-4
14	1.85 (1.11)	208	102	49	25	16	0-4

Table II. Mean, standard deviation (SD) and range of Oral Health Impact Profile-14 (OHIP-14) (n=400)

OHIP -14 DOMAIN	MEAN (SD)	RANGE
Functional limitation	2.20 (1.08)	0-4
Physical pain	2.37 (1.09)	0-4
Psychological discomfort	2.95 (1.31)	0-4
Physical disability	2.24 (1.07)	0-4
Psychological disability	2.57 (1.28)	0-4
Social disability	2.27 (1.15)	0-4
Handicap	2.22 (1.22)	0-4

Table III. Mean, Standard Deviation (SD) and Range of Oral Health Impact Profile (OHIP - 14) Domain. (n=400)

Parameter	Grade I				Grade 2				Grade 3				Grade 4				Grade 5				P value	Sig/NS
	Mean	Min	Max	±SD	Mean	Min	Max	±SD	Mean	Min	Max	±SD	Mean	Min	Max	±SD	Mean	Min	Max	±SD		
Age	20.66	18.00	25.00	1.78	20.89	18.00	25.00	2.10	21.03	18.00	25.00	2.12	21.64	18.00	25.00	2.28	21.00	18.00	23.00	1.90	0.076	NS
DT	1.37	1.00	5.00	0.92	1.42	1.00	9.00	1.05	1.45	1.00	5.00	1.02	1.76	0.00	5.00	1.20	1.50	1.00	3.00	0.84	0.201	NS
MT	1.05	1.00	3.00	0.33	1.15	1.00	3.00	0.48	1.17	1.00	3.00	0.48	1.24	0.00	3.00	0.61	1.83	1.00	3.00	0.98	0.002	HS
FT	1.33	1.00	5.00	0.75	1.71	1.00	5.00	0.90	1.84	1.00	6.00	1.16	1.86	1.00	5.00	1.35	1.83	1.00	5.00	1.60	0.014	Sig
CPI score	2.19	1.00	5.00	0.89	3.14	1.00	7.00	1.10	3.87	2.00	7.00	1.56	4.68	2.00	7.00	1.80	5.00	4.00	7.00	1.10	0.0001	HS
Soft tissue	1.79	1.00	2.00	0.41	1.69	1.00	2.00	0.46	1.77	1.00	2.00	0.42	1.74	1.00	2.00	0.44	1.33	1.00	2.00	0.52	0.079	NS
1	1.27	1.00	3.00	0.48	2.07	1.00	5.00	0.93	2.60	1.00	5.00	1.02	3.55	1.00	5.00	0.95	3.67	3.00	5.00	0.82	0.0001	HS
2	1.42	1.00	4.00	0.64	1.81	1.00	4.00	0.82	2.19	1.00	5.00	1.02	2.88	1.00	5.00	1.07	3.17	2.00	4.00	0.75	0.0001	HS
3	1.81	1.00	4.00	0.98	2.20	1.00	5.00	0.98	2.38	1.00	5.00	1.01	3.36	1.00	5.00	0.91	3.67	3.00	5.00	0.82	0.0001	HS
4	1.67	1.00	5.00	0.94	2.18	0.00	5.00	1.08	2.52	1.00	5.00	0.94	3.11	1.00	5.00	1.04	2.67	2.00	3.00	0.52	0.0001	HS
5	2.12	1.00	5.00	1.26	2.73	1.00	5.00	1.23	3.51	1.00	5.00	1.23	4.02	1.00	5.00	0.94	3.67	2.00	5.00	1.21	0.0001	HS
6	1.93	1.00	5.00	1.05	2.44	1.00	5.00	1.04	3.22	1.00	5.00	1.24	3.88	2.00	5.00	0.98	3.67	2.00	5.00	1.03	0.0001	HS
7	1.59	1.00	4.00	0.83	2.12	1.00	5.00	0.95	2.55	1.00	6.00	1.13	3.14	1.00	5.00	0.99	3.00	2.00	4.00	0.63	0.0001	HS
8	1.58	1.00	5.00	0.90	2.01	1.00	5.00	0.96	2.36	1.00	5.00	1.07	2.65	1.00	5.00	1.06	2.33	1.00	3.00	0.82	0.0001	HS
9	1.66	1.00	5.00	0.89	2.25	1.00	5.00	1.10	2.68	1.00	5.00	1.12	3.00	1.00	5.00	1.01	3.33	3.00	4.00	0.52	0.0001	HS
10	1.74	0.00	11.00	1.45	2.37	1.00	5.00	1.19	3.22	1.00	6.00	1.24	3.65	1.00	5.00	1.25	3.67	3.00	4.00	0.52	0.0001	HS
11	1.44	1.00	5.00	0.85	2.00	1.00	5.00	1.01	2.64	1.00	6.00	1.17	2.86	1.00	5.00	1.08	3.00	2.00	4.00	0.89	0.0001	HS
12	1.55	1.00	5.00	0.90	2.05	1.00	5.00	1.00	2.66	1.00	5.00	1.17	2.92	1.00	5.00	1.14	3.00	3.00	3.00	0.00	0.0001	HS
13	1.49	1.00	5.00	0.85	2.40	1.00	5.00	1.20	2.89	1.00	5.00	1.34	3.61	1.00	5.00	1.18	3.00	2.00	4.00	1.10	0.0001	HS
14	1.36	1.00	4.00	0.75	1.65	1.00	5.00	1.02	2.05	1.00	5.00	1.19	2.45	1.00	5.00	1.17	1.83	1.00	3.00	0.98	0.0001	HS
TMD	1.84	1.00	2.00	0.37	1.77	1.00	2.00	0.42	1.78	1.00	2.00	0.42	1.70	1.00	2.00	0.46	1.67	1.00	2.00	0.52	0.389	NS

Note : One way Anova : F test for Age and Kruskal-Wallis test for other parameters. NS = Non-significant, Sig = Significant and HS = Highly significant

**Table IV : Interrelationship of age, decayed teeth (DT), missing teeth (MT), filled teeth (FT), Community periodontal index(CPI) score, soft tissue disease, OHIP-14 questions and Temporomandibular diseases(TMD) on grades of malocclusion (IOTN-DHC).(n=400)**

Parameter	DT	MT	FT	CPI score	Soft tissue	1	2	3	4	5	6	7	8	9	10	11	12	13	14
MT	0.070																		
FT	-0.257**	0.138**																	
CPI score	0.076	0.104*	0.154*																
Soft tissue	0.036	0.017	-0.045	-0.015															
1	-0.001	0.114*	0.183*	0.289**	-0.060														
2	-0.013	0.030	0.209*	0.180**	-0.029	0.622**													
3	0.003	0.101*	0.155*	0.200**	-0.141**	0.591**	0.553**												
4	0.073	0.088	0.181*	0.189**	-0.127*	0.466**	0.542**	0.578**											
5	0.097	0.121*	0.035	0.206**	0.006	0.459**	0.311**	0.278**	0.324**										
6	0.113*	0.081	0.110*	0.267**	-0.041	0.490**	0.348**	0.381**	0.371**	0.641*									
7	0.018	0.102*	0.098*	0.230**	-0.017	0.451**	0.473**	0.431**	0.404**	0.394*	0.511**								
8	-0.002	0.026	0.226*	0.264**	0.007	0.401**	0.433**	0.407**	0.453**	0.233*	0.378**	0.547**							
9	0.038	0.115*	0.208*	0.241**	-0.019	0.464**	0.399**	0.430**	0.463**	0.319*	0.428**	0.515**	0.541**						
10	0.090	0.144**	0.124*	0.205**	0.034	0.418**	0.246**	0.203**	0.206**	0.475*	0.482**	0.322**	0.182**	0.336**					
11	0.061	0.044	0.117*	0.225**	-0.067	0.401**	0.374**	0.266**	0.324**	0.414*	0.408**	0.421**	0.349**	0.410**	0.515*				
12	0.020	0.059	0.199*	0.216**	-0.048	0.441**	0.480**	0.332**	0.431**	0.350*	0.396**	0.463**	0.466**	0.539**	0.342*	0.578**			
13	0.018	0.080	0.177*	0.237**	-0.046	0.503**	0.454**	0.362**	0.319**	0.471*	0.479**	0.443**	0.336**	0.402**	0.483*	0.521**	0.549**		
14	-0.006	0.005	0.152*	0.197**	-0.021	0.355**	0.402**	0.238**	0.275**	0.210*	0.292**	0.312**	0.433**	0.351**	0.177*	0.406**	0.529**	0.471*	
TMD	0.062	0.002	-0.075	-0.105*	0.224**	-0.156**	-0.140**	-0.281**	-0.197**	-0.060	-0.168**	-0.113**	-0.145**	-0.201**	-0.032	-0.190**	-0.169**	-0.089	-0.156**

Note: \* = Significant, \*\*: highly significant.  $p \leq 0.01$  significant  $p \text{ value} \leq 0.001$  highly significant

**Table V. Correlation of common oral diseases with each other and OHIP-14 questionnaire. (n=400)**

## DISCUSSION

Before assessing the impact of malocclusion on OHRQOL, a correlation was found between MT, DT, and malocclusion as well as CPI score and malocclusion. In this study, no significant correlation was found between DT and malocclusion. Before assessing the impact of malocclusion on OHRQOL, a correlation was found between MT, DT, and malocclusion as well as CPI score and malocclusion. In this study, no significant correlation was found between DT and malocclusion. According to Ingervall et al (1977)<sup>8</sup>, crowding of teeth affects the periodontal health to a minor extent while subjects with greater malocclusion showed more severe periodontal diseases in a study conducted by Bollen AM (2008)<sup>9</sup>. Equivalent results were observed in this work as well.

However, according to Katalin Gabris et al (2006)<sup>10</sup>, 70.4% of the sample with orthodontic anomalies showed caries experience. Similar results were observed in a study conducted by Abbas Assad et al (2015)<sup>11</sup> in a sample of Pakistani school children. The difference in the results maybe that the study mentioned above was on adolescents and children while this was conducted on adults from 18-25 years.

In this study, no correlation was found between TMD, soft tissue diseases and malocclusion. According to Rendell (1992)<sup>12</sup>, a relationship between either the onset of TMJ pain and dysfunction, and course of orthodontic treatment could not be established. In contrast, Michelotti et al (2010)<sup>13</sup> reviewed the cause of TMD being multifactorial, one of the major etiologies being associated with occlusion. Hence orthodontic patient may complain about TMD during treatment.

Our work shows that, malocclusion was significantly associated with poor OHRQOL. Subjects with more severe malocclusion (Grade 4 & 5) reported greater impact on OHRQOL than those without severe malocclusion (Grade 1 & 2). Similar results were shown in studies conducted by Rusanen J et al (2012)<sup>14</sup>, Masood Y et al<sup>15</sup> (2013) and de Oliveira CM et al<sup>16</sup> (2003).

In this research, malocclusion was found affecting psychological discomfort domain of the individual followed by psychological disability, physical pain, physical ability, social disability, handicap and functional limitation respectively. The greatest impact on psychological discomfort and psychological disability domain were also found in young Chinese adults in a study conducted by Mu Chen et al (2015)<sup>17</sup>. Similar results of greater impact on psychological impact were found in a study conducted by Masood Y et al (2013)<sup>15</sup>, in young adults aged 15-25 years. Also, females reported having a higher impact than males and participants with university education reported a significantly higher impact on OHRQOL as compared to those participants with only secondary education like the result obtained in this study. Similar results were obtained on a study conducted in South Indian population by A Vinita Mary et

al (2017)<sup>18</sup>. While according to a study conducted by Choi et al (2015)<sup>3</sup>, physical domain was more significantly associated with malocclusion rather than the psychological domain.

Because orthodontic treatment is basically concerned with the esthetics hence the absence of the treatment may be associated with depression, or anxiety, related to their physical appearance. Hence orthodontic treatment is associated with improvement in the quality of life.

In this piece of work, the sample did not consist of an equal number of males and females as the sample was collected in general Outpatient department of College of Dental Science and Hospital, therefore there was a difference with a greater number of female patients than the males. Since females are supposed to be more concerned about the esthetics hence this might be the reason that results obtained were more skewed towards the psychological domain rather than other domains influencing malocclusion as reported in the earlier studies.

Secondly, there was no uniform distribution of the education level, with a greater number of subjects with post higher secondary education than, that up to secondary education, therefore, this could be the reason for the variation in the results of this study as compared to other earlier reported studies.

Other common oral pathosis such as caries (DMFT), periodontal disease (CPI score), TMD and soft tissue disease also have a negative impact on quality of life. DMFT affects functional limitation, physical pain, physical disability, psychological disability, social disability and handicap domain indicated by very significant relation. CPI score and TMD affect all domains of OHIP-14. Although periodontal status is associated with physical domain while TMD is a cofactor associated with functional limitation domain of OHIP-14. Soft tissue affects physical pain domain. Al-Omiri et al (2014)<sup>19</sup>, also conducted a study showing that soft tissue disease such as recurrent aphthous stomatitis has a negative impact on quality of life. Slade et al (2004)<sup>20</sup>, reported poor quality of life, in individuals, with symptomatic third molar.

One of the shortcomings of the following study was that it was carried out on individuals who reported in the general outpatient department with other oral problems apart from orthodontic problems thus there may be variations in the impact of other common oral diseases involved in the study with malocclusion as well as OHIP-14 domains.

In future, further research can be done using pre and post treatment evaluation of OHIP-14 questionnaire and other indices to see the effect of orthodontic treatment on their scores in a longitudinal randomized clinical trial to further validate claim that orthodontic treatment does improve the quality of life.

## CONCLUSION

Our work has shed light, that individuals with malocclusion have a negative impact on quality of life in young adults without orthodontic treatment, especially affecting their psychological aspect, in population of Indore- Malwa region, also factoring the common oral diseases.

Oral diseases such as caries, periodontal diseases, various soft tissue diseases and temporomandibular diseases have shown an association with malocclusion as well as quality of life. Consequently, above mentioned conditions along with sociodemographic factors should also be considered as shown by our study. Therefore, there is need to raise awareness of various factors among the population affecting the quality of life of a person.

Our endeavor has shown that, various other common oral diseases also affects oral health related quality of life in young people, therefore, we should also consider more factors rather than considering mere absence of oral disease.

We as an orthodontist tend to see, plan and treat only malocclusion by either ignoring or less emphasizing on other aspects related to quality of life, and this type of negligence will lead to suboptimal treatment plan, hence it will not be able to enhance quality of life of an individual to its full potential despite quality orthodontic treatment. On that account, orthodontist should enhance their perception and should also include other factors affecting quality of life of an orthodontic patient.

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