

Increase in Oral Malodor in Patients with fixed orthodontic treatment

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ABSTRACT

Background: Oral malodor is a breath, offensive to other people. It is considered to affect huge number of the people due to certain variable causes and intensity. Malodor may indicate towards some systemic complications but 80–90% is related to intraoral conditions.

Aim: To determine the mean rise in oral malodor score in patients with fixed orthodontic treatment.

Methods: This Quasi experimental study was conducted at de'Montmorency College of dentistry, Lahore and consisted of six months. Non probability consecutive sampling was used to select 75 cases with 95% confidence interval.

Results In this present study total 75 patient, 38(50.66%) male and 37(49.33%) female, 15 to 25 years of age were selected. Oral malodor was recorded by same doctor. The mean value of baseline malodor score (T1) was 57.57 ± 10.32 ppb with minimum and maximum baseline oral malodor score (T1) 40 & 72 ml respectively. The study results showed that the mean value of malodor score four weeks after treating the patients (T2), was 95.08 ± 8.75 ppb with minimum and maximum malodor score 81 & 110 ppb respectively. In this study, mean increase in malodor four weeks after treating patients was 37.50 ± 14.72 ppb with minimum and maximum increase in malodor score 12 & 67 ppb respectively. Paired t-test was found significant. In our study the mean value of baseline malodor score (T1) in males (n=38) was 58.056 ± 10.02 ppb. And in females (n=37) was 94.89 ± 8.98 ppb.

Conclusion Our study results concluded that the baseline oral malodor score was (T1) 57.57 ± 10.32 and after 4 weeks of treatment was (T2) 95.08 ± 8.75 and a mean increase on oral malodor score was 37.50 ± 14.72 .

Keywords: Oral Malodor, Fixed Orthodontic treatment

INTRODUCTION

Halitosis or bad breath is disliked by many people¹. It is considered to affect around Half of the world's population with various causes and severity^{1,2}. Outcomes of halitosis can be beyond a social impact. Malodor may indicate towards some systemic complications but among all cases, 80–90% is related to intraoral conditions². Therefore, general physicians considering it a dental problem, refer such patients to them.² Several extra-oral factors of halitosis may include systemic, GIT and upper respiratory tract disorders. Halitosis felt from mouth, it is called oral malodor or bad breath³. Volatile sulfide compounds (VSCs) are thought to be the main agents causing halitosis⁴. The clinicians are worried and trying to introduce ways of controlling plaque formation and motivation of improving oral hygiene of the community due to data collection indicating signs of increasing role of oral infections and hygiene in various systemic diseases⁵.

Good oral hygiene is a big challenge for fixed orthodontic's patients⁶. Many researchers have observed that fixed orthodontic appliance therapy deteriorates oral health of patients immediately after 24 hour of placement,⁷ and is worst during the first week of insertion of the appliance.⁸ Comparatively other researchers have also mentioned that it may either improve or compromise the oral cavity features of the patients through various stages of treatments.⁹ Moreover, others have pointed out gingival inflammation due to hampered oral hygiene measures resulting in increased bacterial plaque formation after use of fixed orthodontic appliances¹⁰. A study done by Babacan H et al on 21 cases treated by fixed orthodontic appliances, the baseline oral malodor score was 58.55 ± 13.77 and after 4 weeks of treatment was 94.70 ± 12.31 and a mean increase on oral malodor score was 36.15 ± 1.46 ^{11,12}. The rationale of our study was to determine the mean increase in oral malodor score in patients with fixed orthodontic treatment and therefore the doctor can warn the patient about oral malodor and guide him/her to achieve and maintain good oral hygiene to prevent an increase in oral malodor. Moreover, it will be beneficial for the doctor as oral malodor can be considered as an additional evaluation criteria of oral health of the patients seeking fixed orthodontic treatment.

In fixed orthodontic therapy, dentists should pay special attention to the tissues and sites in oral cavity, such as periodontal pocketing, tonsillar crypts and the posterior dorsum of the tongue. These sites act as ideal places for food impaction and gram-negative anaerobic bacteria accumulation resulting in sources of VSC production if daily cleansing is ignored. Care and correction of such tissues can provoke motivation in patients¹³.

The objective of the study was to determine the mean rise in oral malodor score in patients with fixed orthodontic treatment.

MATERIAL AND METHODS

It was a Quasi experimental study conducted at de'Montmorency College of dentistry, Punjab Dental Hospital, Lahore. It consisted of six months duration. Non probability consecutive sampling was done. Seventy five (75) cases were studied with 95% confidence level $d=0.05$ and taking expected mean increase in oral malodor score i.e. 36.15 ± 1.46 in patients with fixed orthodontic treatment.

After obtaining hospital ethical committee approval and patient's informed consent, seventy five subjects were selected for this study. Special instructions to avoid spicy foods, onions, and garlic for 48 hours before the appointment, do proper tooth brushing after dinner and avoid eating and drinking anything till appointment with dentist next morning, were given to each patient. Measurements were taken before bonding or baseline oral malodor value (T1). Following a classic bonding procedure orthodontic metal brackets (3M Brackets) were bonded and Nickel-titanium leveling wire was attached to all teeth in first session. Oral malodor scoring was measured for each patient by the same doctor. Scoring was done before bonding or baseline oral malodor value (T1) and 4 weeks after bonding (T2).

A Halimeter (Interscan) device was used to score the halitosis value in parts per billion (ppb). Oral malodor values were considered normal if values range from 0-100 ppb and strong if they are ≥ 150 ppb. And a mean increase in oral malodor was determined by subtracting baseline oral malodor value (T1) from post treatment oral malodor value (T2). Data was entered and analyzed in SPSS version 20. Mean[±]SD was found for quantitative variables of age, baseline oral malodor value and value after 4 weeks of treatment. And a mean increase in oral malodor score was determined by subtracting the baseline oral malodor value from the post treatment oral malodor value. Frequencies and

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percentage was computed for categorical variable like gender and mean increase in oral malodor score. Paired "t" test was used to test the significant level for mean increase in oral malodor score. $P \leq 0.05$ was considered as significant.

Inclusion Criteria: Patients with

1. Good oral health assessed by history and clinical examination i.e. Plaque index using CPTIN probe, no history of gingival bleeding on probing, no caries, no history of pan and betel nut chewing
2. Ages from 15 to 25
3. No previous Orthodontic treatment assessed by history
4. No Orthognathic surgery required assessed by history

Exclusion Criteria: Patients with

1. Unsatisfactory oral hygiene assessed by history and clinical examination e.g. bleeding on probing, grossly carious teeth
2. Smokers
3. Any systemic disease assessed by history e.g. bleeding disorders, viral infections like hepatitis, jaundice
4. Disorder of gastrointestinal tract assessed by history e.g. GIT upset, nausea or gastric ulcers
5. Disorder of upper respiratory tract assessed by history e.g. cough, pulmonary infection, Tuberculosis

RESULTS

In this present study total 75 subjects were selected. Oral malodor of each patient was measured by same doctor. Measurements were taken before bonding or baseline oral malodor value (T1) and 4 weeks after bonding (T2). The mean age of the patients was 20 ± 3.44 years with minimum and maximum ages of 15 & 25 years respectively (Table 1).

In this study 38(50.66%) patients were male and 37(49.33%) were female (Table 2). In our study the mean value of baseline malodor score (T1) was 57.57 ± 10.32 ppb with minimum and maximum baseline oral malodor score (T1) 40 & 72 ml respectively, mean value of malodor score after 4 weeks of treatment (T2) was 95.08 ± 8.75 ppb with minimum and maximum malodor score after 4 weeks of treatment (T2) 81 & 110 ppb respectively and mean increase after 4 weeks of treatment was 37.50 ± 14.72 ppb with minimum and maximum increase in malodor score after 4 weeks of treatment 12 & 67 ppb respectively. Paired t-test was found significant (Table 3).

Table 4: Descriptive statistics of malodor scores for male and female patients with increased levels in ppb.

Descriptive Statistics	Males Score (ppb)			Females Score (ppb)		
	T1	T2	Increase	T1	T2	Increase
N	38	38	38	37	37	37
Mean	58.05	95.26	37.21	57.08	94.89	37.81
SD	10.52	8.65	13.52	10.24	8.98	15.19
Minimum	40	81	12	40	81	12
Maximum	72	108	67	72	110	64

DISCUSSION

A Healthy person normally has a slightly sweet and generally acceptable smell of breath which can be affected by oral condition, food intake, oral hygiene care, rate of salivation and time of the day. Oral Malodor an unpleasant smell from mouth and analogous to body smell, is a common complaint often causing embarrassment and affect social life. The accuracy and sensitivity of epidemiological data about prevalence of malodor is limited due to subjective self-estimation in most of the cases. Some studies show prevalence of malodor about 30–50% while some recent study indicated a lower prevalence rate of only 15%¹⁴ with of 3:1 men to women ratio and was slightly more than 3:1 ratio in people above 20 years of age compared to 20 years or below. In this present study total 75 subjects were enrolled in the study. Oral malodor was recorded before and after the treatment by same nominated doctor. Measurements were recorded of the selected patients before bonding or baseline oral malodor value (T1) and 4 weeks after bonding (T2). The mean age of the patients was

In our study the mean value of baseline malodor score (T1) in males (n=38) was 58.056 ± 10.02 ppb with minimum and maximum baseline oral malodor score (T1) in males 40&72ml respectively, while mean value of baseline malodor score (T1) in females (n=37) was 94.89 ± 8.98 ppb with minimum and maximum baseline oral malodor score (T1) in males 81 & 110 ml respectively. The mean value of malodor score after 4 weeks of treatment (T2) in males (n=38) was 95.26 ± 8.65 ppb with minimum and maximum malodor score after 4 weeks of treatment (T2) in males 81 & 108 ppb respectively while the mean value of malodor score after 4 weeks of treatment (T2) in females (n=37) was 94.89 ± 8.98 ppb with minimum and maximum malodor score after 4 weeks of treatment (T2) in males 81 & 110 ppb respectively. In this study, mean increase in malodor score after 4 weeks of treatment in males (n=38) was 37.21 ± 13.52 ppb with minimum and maximum increase in malodor score after 4 weeks of treatment in males 12 & 67 ppb respectively, while mean increase in malodor score after 4 weeks of treatment in males (n=37) was 37.81 ± 15.91 ppb with minimum and maximum increase in malodor score after 4 weeks of treatment in females 12 & 64 ppb respectively (Table 4).

Table 1: Descriptive statistics of age (years)

Age (years)	N	75
	Mean	20.17
	SD	3.44
	Minimum	15
	Maximum	25

Table 2: Frequencies of Gender

Gender	Frequency	Percentage
Male	38	50.66%
Female	37	49.33%
Total	75	100 %

Table 3: Descriptive statistics of malodor score baseline T1, after 4 weeks of treatment T2 and increase in ppb.

Descriptive Statistics	Baseline (T1)	After 4 weeks of Treatment T2	Increase in Malodor (ppb)
N	75	75	75
Mean	57.57	95.08	37.50
SD	10.32	8.75	14.72
Minimum	40	81	12
Maximum	72	110	67

Paired t-test= 22.75

P-value= 0.000

20.75 ± 3.44 years with 15 & 20 being minimum and maximum ages respectively. In a study conducted on patients of fixed orthodontic treatment evaluated the patients have mean age of 19.5 years¹⁵. In our study the mean value of baseline malodor score (T1) was 57.57 ± 10.32 ppb with minimum and maximum baseline oral malodor score (T1) 40 & 72 ml respectively. Mean value of malodor score after 4 weeks of treatment (T2) was 95.08 ± 8.75 ppb with minimum and maximum malodor score after 4 weeks of treatment (T2) 81 & 110 ppb respectively. Mean increase in malodor score after 4 weeks of treatment was 37.50 ± 14.72 ppb with minimum and maximum increase in malodor score after 4 weeks of treatment 12 & 67 ppb respectively. Babacan H et al¹⁶ on 21 cases treated by fixed orthodontic appliances, the baseline oral malodor score was 58.55 ± 13.77 and after 4 weeks of treatment was 94.70 ± 12.31 and a mean increase on oral malodor score was 36.15 ± 1.46 . The study results showed that paired t-test was applied for mean testing. Statistically significant mean difference was found between baseline and after treatment malodor scores. Paired t-test was found significant. Studies conducted by A Filipi et al¹⁷ and some others¹⁸ also showed similar results indicating

significant increase in plaque and tongue coating indices after using fixed orthodontic appliances.

CONCLUSION

Our study results concluded that the baseline oral malodor score was 57.57 ± 10.32 and after 4 weeks of treatment was 95.08 ± 8.75 and a mean increase on oral malodor score was 37.50 ± 14.72 .

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