

A Questionnaire Based Comparative Comfort Analysis of Lingual and Labial Fixed Orthodontic Appliances

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ABSTRACT

Background: Aesthetic consideration in adults has increased the demand for adult orthodontics. Objective of this study was to determine the discomfort differences between the patients treated with lingual and labial orthodontic appliance.

Materials and Methods: Study subject comprised of 60 adult patients reporting to various orthodontic departments across south Karnataka. Among them 30 patients were treated with Lingual appliance and 30 patients were treated with Labial appliance. After initial strap up, all patients were handed a questionnaire with 10 questions to record the intensities of discomfort.

Results: Average intensity of tongue discomfort in lingual group was 2.78, in labial group it was 1.19. Intensity of cheek discomfort in lingual group was 1.31, in labial group it was 2.38. Intensity of lip discomfort in lingual group was 1.58, in labial group it was 2.4. Intensity of speech discomfort in lingual group was 2.83, in labial group it was 1.79. Intensity of food accumulation between the appliances in lingual group was 3.02, whereas in labial group it was 2.1. Intensity of swallowing difficulty in lingual group was 2.6, in labial group it was 1.23. Intensity of malodor in lingual group was 2.4, in labial group it was 1.6. (0-1 No discomfort, 1-2 Mild, 2-3 Moderate, 3-4 Severe)

Conclusion: It was concluded that the tongue discomfort, swallowing discomfort, speech discomfort, food accumulation and oral malodor were higher in Lingual group. Whereas the lip discomfort, cheek discomfort were higher in Labial group. But there was no much discomfort difference in chewing hard and soft food among Labial and Lingual groups.

Keywords: Questionnaire, Discomfort, Labial appliance, Lingual appliance.

INTRODUCTION

Current advances in orthodontics have broadened the possibilities of invisible orthodontic appliances offered to adult patients. The introduction of the lingual appliance (Lingual) provided a significant aesthetic advantage to

patients (Fujita, 1978), but functional difficulties and prolonged adaptation reduced its use until recent years (Sinclair *et al.*, 1986; Creekmore, 1989). Only a few publications have appeared dealing with patient characteristics, acceptance, and motivation. Lingual orthodontic patients are usually

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informed that there may be some tongue discomfort and speech difficulty associated with the insertion of the appliance. However, the intensity and duration of the problems are not yet entirely clear, and orthodontists are still dubious of the patient's ability to adapt to lingual brackets. This study was undertaken to determine the discomfort differences between the patients treated with lingual and labial orthodontic appliances.

OBJECTIVE OF THE STUDY

The study was conducted with the following aims and objectives:

- To determine the discomfort differences between the patients treated with lingual and labial orthodontic appliance in relation to pain

Soft tissue discomfort
Speech Disturbance
Eating disturbances
Oral hygiene problems
Adaptation period

- To draw inferences from the above findings.

MATERIALS AND METHODS

INCLUSION CRITERIA

Adult patients seeking comprehensive orthodontic treatment

EXCLUSION CRITERIA

- Previous history of orthodontic treatment and/or orthognathic surgery.
- Presence of craniofacial anomalies.
- Presence of a non-continuous soft tissue contour at the level of the chin indicating a chin strain.
- Patients with obvious speech/hearing impairment or defects.

PROCEDURE

The study sample consisted of 60 adult patients reporting to the Department of Orthodontics. These patients were divided into two groups. The first group (LI) consisted of 30 patients treated with Lingual appliance. The second group (LA) consisted of 30 patients treated with Labial appliance. The LI

group were treated with STB lingual brackets indirectly bonded on both arches during the same appointment. 0.012 inch copper NiTi was used as the initial arch wire on both the arches. The LA group were treated with a straight wire appliance(MBT), directly bonded on both arches during the same appointment.0.012 inch copper NiTi was used as the initial arch wire on both the arches. After initial strap up, all patients were handed a questionnaire form which included 10 questions and each question consisted of four different intensities (Not at all, Slightly, Yes to some extent, Yes definitely).The patients were asked to record the discomfort like intraoral irritation of the tongue, cheek, and lip areas, mastication problems, oral hygiene problems and changes in speech patterns etc in the given questionnaire at the end of first week, first month, second month and third month after strap up. Patients were asked to tick in the corresponding box given in the questionnaire form according to the intensity of discomfort. Bedtime was chosen for completion of the home questionnaire to provide consistency and ease of remembrance. A reminder call was given to the patients at the above time intervals. Patient were asked to return the filled questionnaire form after the end of 3rd month after initial strap up

"A QUESTIONNAIRE BASED COMPARATIVE COMFORT ANALYSIS OF LINGUAL AND LABIAL FIXED APPLIANCES"

QUESTIONNAIRE

Patient Name: _____

Age/Sex: _____

Type of appliance: _____

Date of initial strap up: _____

Sl no	QUESTIONS	END OF 1 st WEEK				END OF 1 st MONTH				END OF 2 nd MONTH				END OF 3 rd MONTH			
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
1	Intensity of tongue discomfort																
2	Intensity of cheek discomfort																
3	Intensity of lip discomfort																
4	Intensity of speech discomfort																
5	Intensity of difficulty in chewing hard food																
6	Intensity of difficulty in Chewing Soft food																
7	Intensity of difficulty in maintaining (Brushing) the appliance																
8	Intensity of food accumulation between the appliance																
9	Intensity of difficulty in swallowing																
10	Intensity of oral malodor(Halitosis)																

A- Not At All (1) B- Slightly (2) C- Yes To Some Extent (3) D- Yes Definitely (4)

***PLEASE TICK MARK (✓) ON CORRESPONDING BOX.

STATISTICAL ANALYSIS

Table 1: Intensity of tongue discomfort.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	3.6333	0.61495	16.155	0.000 (H.S)
	Labial	30	1.3333	0.47946		
End of 1 st month	Lingual	30	2.6000	0.77013	7.648	0.003 (H.S)
	Labial	30	1.3333	0.47946		
End of 2 nd month	Lingual	30	2.4333	0.56832	10.704	0.000 (H.S)
	Labial	30	1.1333	0.34575		
End of 3 rd month	Lingual	30	2.4667	0.86037	9.337	0.000 (H.S)
	Labial	30	1.0000	0.0000		

(H.S – Highly statistically significant, p value < 0.05) 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort , 3 -4 Severe discomfort

Table 2: Intensity of cheek discomfort.

Groups		N	Mean	Standard deviation	T	P value
End of 1 st week	Lingual	30	1.5000	0.68229	-11.085	0.001 (H.S)
	Labial	30	3.1667	0.46113		
End of 1 st month	Lingual	30	1.4333	0.50401	-9.862	0.000 (H.S)
	Labial	30	2.8333	0.59209		
End of 2 nd month	Lingual	30	1.1667	0.37905	-10.790	0.000 (H.S)
	Labial	30	2.4000	0.49827		
End of 3 rd month	Lingual	30	1.1667	0.37905	0.000	1.000 (N.S)
	Labial	30	1.1667	0.37905		

[H.S – Highly statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort , 3 -4 Severe discomfort

Table 3: Intensity of lip discomfort.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	2.5333	0.50742	-10.155	0.002 (H.S)
	Labial	30	3.7667	0.43018		
End of 1 st month	Lingual	30	1.3667	0.49013	-7.211	0.000 (H.S)
	Labial	30	2.3333	0.54667		
End of 2 nd month	Lingual	30	1.3000	0.46609	-8.309	0.000 (H.S)
	Labial	30	2.3000	0.46609		
End of 3 rd month	Lingual	30	1.1667	0.37905	-0.931	0.064 (N.S)
	Labial	30	1.2667	0.44978		

[H.S – Highly statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort, 3 -4 Severe discomfort

Table 4: Intensity of speech discomfort.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	3.6333	0.61495	3.357	0.001 (H.S)
	Labial	30	3.0000	0.83045		
End of 1 st month	Lingual	30	2.8667	0.81931	5.662	0.000 (H.S)

End of 2 nd month	Labial	30	1.7667	0.67891	9.824	0.020 (S)
	Lingual	30	2.5667	0.56832		
End of 3 rd month	Labial	30	1.2667	0.44978	7.389	0.001 (H.S)
	Lingual	30	2.3000	0.74971		
	Labial	30	1.1667	0.37905		

[H.S – Highly statistically significant, S – Statistically significant (p value < 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort, 3 -4 Severe discomfort.

Table 5: Intensity of difficulty in chewing hard food.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	3.4667	0.73030	-0.826	0.014 (S)
	Labial	30	3.6000	0.49827		
End of 1 st month	Lingual	30	2.6667	0.71116	0.194	0.534 (N.S)
	Labial	30	2.6333	0.61495		
End of 2 nd month	Lingual	30	2.6333	0.55605	0.969	0.336 (N.S)
	Labial	30	2.5000	0.50855		
End of 3 rd month	Lingual	30	2.5667	0.93526	6.891	0.000 (H.S)
	Labial	30	1.2667	0.44978		

[H.S – Highly statistically significant, S – Statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort , 3 -4 Severe discomfort.

Table 6: Intensity of difficulty in chewing soft food.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	2.1000	0.66176	-2.846	0.006 (H.S)
	Labial	30	2.5333	0.50742		
End of 1 st month	Lingual	30	1.9000	0.71197	1.891	0.064 (N.S)
	Labial	30	1.6000	0.49827		
End of 2 nd month	Lingual	30	1.5667	0.56832	1.871	0.066 (N.S)
	Labial	30	1.3000	0.53498		
End of 3 rd month	Lingual	30	1.4333	0.50401	1.351	0.016 (S)
	Labial	30	1.2667	0.44978		

[H.S – Highly statistically significant, S – Statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort, 3-4 Severe discomfort.

Table 7: Intensity of difficulty in maintaining the appliance.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	3.5000	0.62972	0.830	0.410 (N.S)
	Labial	30	3.3667	0.61495		
End of 1 st month	Lingual	30	3.3000	0.65216	4.467	0.000 (H.S)
	Labial	30	2.5667	0.56832		
End of 2 nd month	Lingual	30	2.6000	0.49827	2.720	0.041 (S)
	Labial	30	2.2667	0.44978		
End of 3 rd month	Lingual	30	3.2000	0.66436	10.233	0.000 (H.S)
	Labial	30	1.5667	0.56832		

[H.S – Highly statistically significant, S – Statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort, 3-4 Severe discomfort.

Table 8: Intensity of food accumulation between the appliance.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	3.2000	0.61026	-0.200	0.388 (N.S)
	Labial	30	3.2333	0.67891		
End of 1 st month	Lingual	30	3.2000	0.61026	4.383	0.000 (H.S)
	Labial	30	2.5667	0.50401		
End of 2 nd month	Lingual	30	2.9000	0.88474	6.859	0.006 (H.S)
	Labial	30	1.6333	0.49013		
End of 3 rd month	Lingual	30	2.8333	0.69893	10.324	0.056 (N.S)
	Labial	30	1.2667	0.44978		

[H.S – Highly statistically significant, S – Statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort, 3-4 Severe discomfort.

Table 9: Intensity of difficulty in swallowing.

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	3.2333	0.67891	8.432	0.000 (H.S)
	Labial	30	1.6667	0.75810		
End of 1 st month	Lingual	30	2.6333	0.66868	10.914	0.000 (H.S)
	Labial	30	1.1333	0.34575		
End of 2 nd month	Lingual	30	2.3333	0.71116	8.729	0.000 (H.S)
	Labial	30	1.1000	0.30513		
End of 3 rd month	Lingual	30	2.3667	0.71840	8.473	0.000 (H.S)
	Labial	30	1.1333	0.34575		

[H.S – Highly statistically significant, S – Statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort, 3-4 Severe discomfort.

Table 10: Intensity of oral malodour (halitosis).

Groups		N	Mean	Standard deviation	t	P value
End of 1 st week	Lingual	30	1.7000	0.59596	2.896	0.005 (H.S)
	Labial	30	1.3000	0.46609		
End of 1 st month	Lingual	30	2.3333	0.71116	6.943	0.028 (S)
	Labial	30	1.2667	0.44978		
End of 2 nd month	Lingual	30	2.4000	0.62146	6.139	0.000 (H.S)
	Labial	30	1.5000	0.50855		
End of 3 rd month	Lingual	30	3.2000	0.66436	4.368	0.000 (H.S)
	Labial	30	2.5333	0.50742		

[H.S – Highly statistically significant, S – Statistically significant (p value < 0.05), N.S – Non significant (p value > 0.05)] 0-1 No discomfort, 1- 2 Mild discomfort , 2-3 Moderate discomfort, 3-4 Severe discomfort.

Under statistical analysis the data were collected, coded and fed in the SPSS software (IBM version 23).

RESULTS

Under statistical analysis the data were collected, coded and fed in the SPSS software (IBM

version 23). The comparison of the data was analyzed using a parametric test (independent t test). Difference associated with p value less than 0.05 were considered statistically significant.

Intensity of tongue discomfort was higher in the patients treated with lingual appliance compared to labial appliance. The intensity of

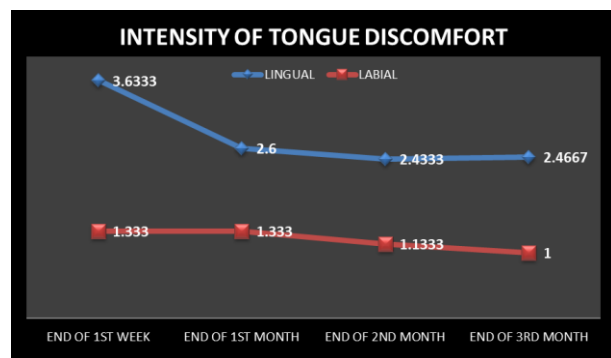


Fig 1: Intensity of tongue discomfort.

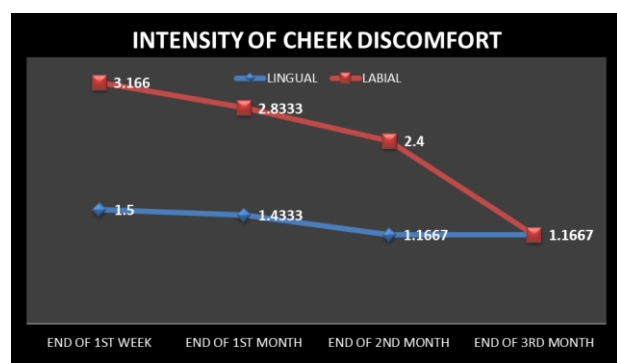


Fig 2: Intensity of cheek discomfort.

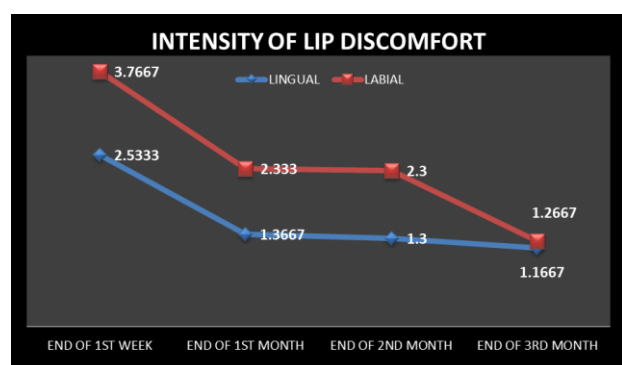


Fig 3: Intensity of lip discomfort.

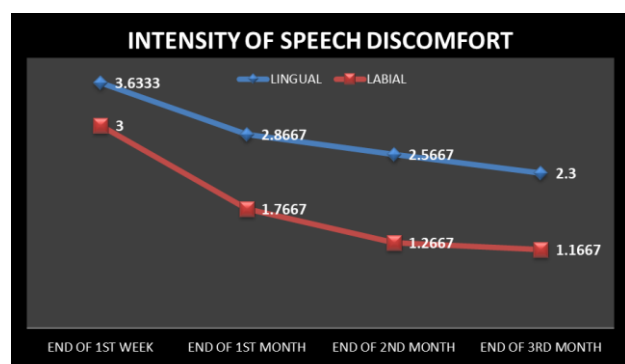


Fig 4: Intensity of speech discomfort.

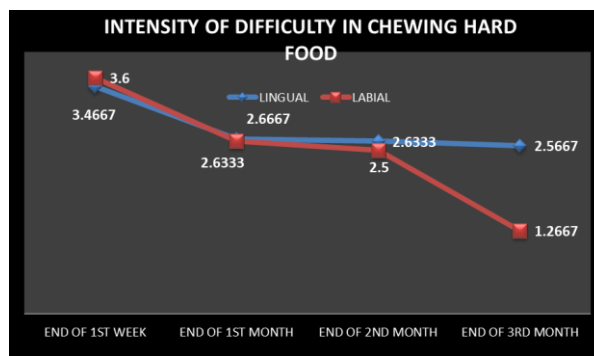


Fig 5: Intensity of difficulty in chewing hard.

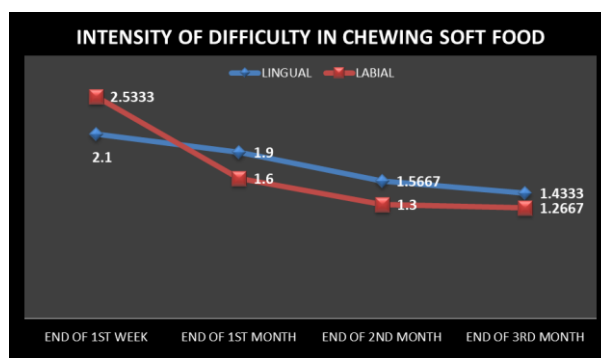


Fig 6: Intensity of difficulty in chewing soft food.

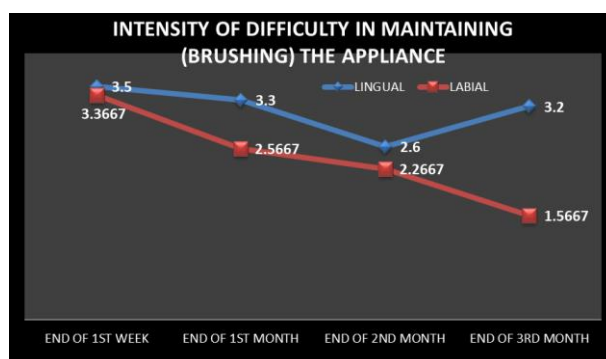


Fig 7: Intensity of difficulty in maintaining (brushing) the appliance.

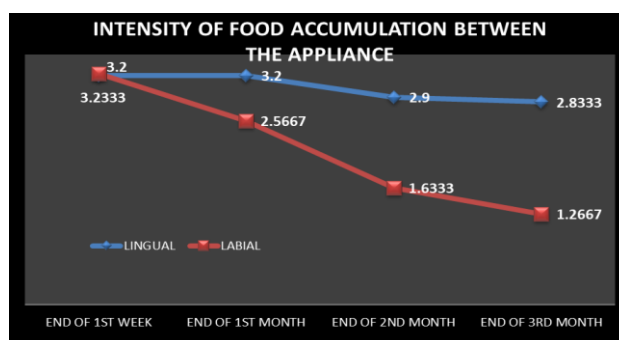


Fig 8: Intensity of food accumulation in maintaining the appliance.

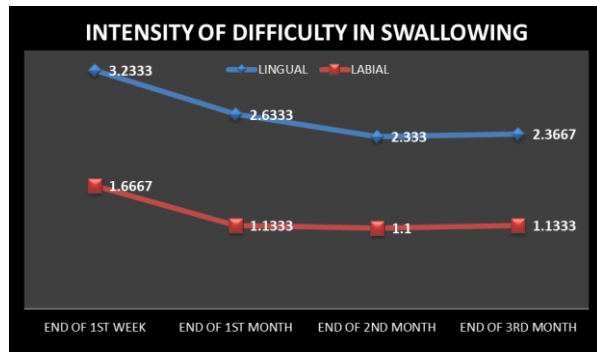


Fig 9: Intensity of difficulty in swallowing.

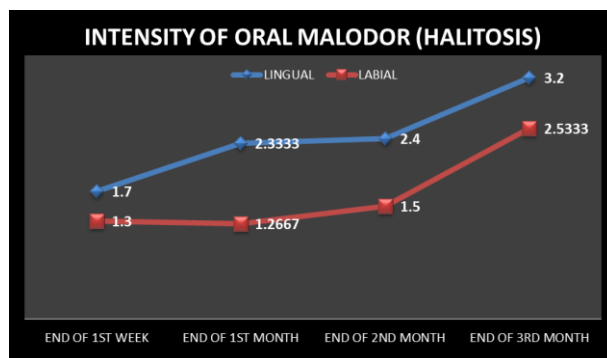


Fig 10: Intensity of oral malodour(Halitosis).

discomfort was severe in lingual group at the end of 1st week and was reduced to mild discomfort at the end of 3rd month after initial strap up. The reduction in cheek discomfort with lingual appliance till the end of 3rd month may be due to physiological adaptation of appliance with oral cavity. The cheek discomfort with lingual appliance maybe due to buccal attachments like bondable button or maybe due to idiopathic reason. The overall cheek discomfort with labial appliance were more compared to lingual appliance till the end of 2nd month after initial strap up. But at the end of 3rd month the cheek discomfort with labial and lingual appliance were same.

Intensity of cheek discomfort after strapup was higher in the patients treated with labial appliance compared to lingual appliance. However at the end of 3rd month the intensity of cheek discomfort were same in patients treated with labial and lingual appliance. The lip discomfort with lingual appliance maybe due to buccal attachments or due to some idiopathic reason. The overall lip discomfort with labial appliance was more compared to lingual appliance.

Intensity of lip discomfort after strap up was higher in the patients treated with labial appliance compared to lingual appliance. However at the end of 3rd month the intensity of lip discomfort were almost same in patients treated with labial and lingual appliance.

Intensity of speech discomfort after strapup was almost same in initial 1st week in the patients treated with labial and lingual appliance. The speech discomfort were reduced dramatically to minimum discomfort at the end of 3rd month in labial appliance group which may be due to quicker adaptation of the appliance with oral cavity. The speech discomfort with labial appliance maybe due to lingual attachments like Trans palatal arch, lingual arch, lingual button, lingual sheaths etc or may be due to idiopathic reason. The overall speech discomfort with lingual appliance were more compared to labial appliance. Intensity of difficulty in chewing hard food after strapup was almost equal in the patients treated with labial and lingual appliance till the end of 2nd month. Intensity of difficulty in chewing soft food after strapup was almost equal in the patients treated with labial and lingual appliance till the end of 3rd month. Intensity of difficulty in maintaining the appliance after strapup was almost equal in the patients treated with labial and lingual appliance in the initial 1st week. However at the end of 3rd month Intensity of difficulty in maintaining the lingual appliance were increased compared to labial appliance group. Intensity of food accumulation between appliance after strapup was almost equal in the patients treated with labial and lingual appliances. However at the end of 3rd month Intensity of food accumulation between the labial appliance were reduced compared to lingual appliance group. Intensity of difficulty in swallowing after strapup was higher in the patients treated with lingual appliance compared to labial appliance. The swallowing difficulties with labial appliance maybe due to lingual attachments like Trans palatal arch, lingual arch, lingual button, lingual sheaths etc or may be due to idiopathic reason. The overall swallowing discomfort with lingual appliance was more compared to labial appliance.

Intensity of malodor after strapup was almost equal in the patients treated with labial and lingual appliance in the initial 1st week. However at

the end of 3rd month Intensity malodor increased dramatically in both labial and lingual group.

DISCUSSION

Two most important reasons for adult patients being discouraged from seeking orthodontic treatment are pain and discomfort³¹. Patients often experience a considerable amount of discomfort and pain associated with labial and lingual orthodontic appliance. This pain and discomfort is often described as a feeling of pressure, tension, ache and soreness of teeth³². Pain and discomfort during labial orthodontic treatment and during lingual orthodontic treatment were investigated separately.

This prospective study was designed to use subjective questionnaires to determine the intensity of discomforts between patients treated with Labial and Lingual appliances. Discomfort with the appliance including tongue discomfort, cheek discomfort, lip discomfort, speech disturbances, difficulty in chewing hard food, difficulty in chewing soft food difficulty in maintaining the appliance, food accumulation between the appliance and malodor with the appliance were noted through a questionnaire and data were collected at the end of first week, end of 1st month, at the end of 2nd month and at the end of 3rd month. Patients were selected randomly across various dental colleges in south Karnataka. study sample sizes were 30 labial and 30 lingual cases.

In this investigation, trans palatal bars, Nance palatal arches and lingual arches were used in some patients in the Lingual group to reinforce anchorage. The nature of the lingual technique is uncomfortable for patients. Therefore, one should avoid the use of auxiliaries such as trans palatal bars and Nance appliances along with lingual brackets as far as possible. Mini screws and implants should be considered more often to reinforce anchorage when using this technique. Interestingly, in this study, the incidence of tongue discomfort in the Labial group may be due to cleats and buttons used on the lingual side, to the Nance appliances, or to the trans palatal bars (or all) used in these patients. On the other hand, the patients in the lingual group claimed some discomfort in their cheeks and lips, this may be because of molar tubes

on the labial sides or because of the removable lip bumpers (or both) used in these cases.

One of the interesting findings of our study was the patients in the Labial group reported some problems in speaking. This may be due to the Nance appliances and trans palatal arches used in combination with labial orthodontic appliances.. Patients with these appliances experienced articulation problems at the beginning of treatment, which gradually decreased with time.

CONCLUSION

This study was conducted among adult patients reported to various orthodontic departments across south Karnataka. The study was conducted to determine the discomfort differences between patients treated with Labial and Lingual orthodontic appliances in relation to pain, speech etc and draw inferences from them. Patients were given a questionnaire at the time of initial strapup to record the intensity of discomfort at the end of 1st week, at the end of 1st month, at the end of 2nd month, at the end of 3rd month. It was concluded that the tongue discomfort, swallowing discomfort, speech discomfort, intensity of food accumulation and intensity of oral malodor were higher in patients treated with Lingual appliances. Whereas the intensity of lip discomfort, cheek discomfort were higher in patients treated with Labial appliance. But there was no much discomfort difference in intensity of chewing hard and soft food among patients treated with both Labial and Lingual orthodontic appliances.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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