



THE ANALYSING ANTIMICROBIAL EFFICACY OF DIFFERENT ORAL PROPHYLACTIC METHODS PERFORMED AT HOME DURING FIXED ORTHODONTIC MECHANOTHERAPY

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Introduction

Nowadays orthodontic treatment is being admiring at superior level as it improves the self-image of patients through the provision of better esthetics and a more attractive smile and fixed orthodontic treatment is the preferential as well as familiar method for treating malocclusion. ^[1,2]

Although various techniques and active components such as arch wires, springs, elastics while passive components comprise of bands, brackets, buccal tubes and ligature wires are being used during the treatment modalities. ^[3,4,5] But orthodontics can in belief have enduring health recompense for patients, since warped and crammed full teeth are tricky to clean and sustain. ^[2,3]

Earlier stainless-steel ligatures for securing of the arch wires to the bracket slot were used and then during 1960s elastomeric ligature became accessible. ^[6, 7] As the advancement are peaking into existence while during the 1990s; newer self ligation system were introduced. This ligation system was introduced to reduce the friction between arch wires and bracket slot and that drawing better torque control. ^[6, 7,8] Even from the patient's perspective the self ligating system due to wing less design easy to clean facilitate better oral hygiene. ^[9,10] Despite the post therapy health advantages of orthodontics, the treatment regimen itself creates obstacles for patients, because orthodontic brackets create plaque-retentive sites that impede tooth cleaning. ^[2,4] Dental plaque is a causative factor for oral disease, and thus its removal and control are important aspects of oral health maintenance. This plaque can lead to enamel demineralization and gingivitis. ^[11, 12] Various studies have reported that rate of decalcification in orthodontic patients is superior than that of non- orthodontic treated patients . White spots have been reported in as many as 50% of teeth treated with brackets and in up to 50% of orthodontic patients. ^[7,11,13] When fixed orthodontic appliances are placed intraorally, effective plaque removal becomes obstructed to a discernible degree. Since many

years a variety of plaque manageable techniques were advocated but fewer studies advocate scrupulous oral cleanliness, portentous the utilization of irrigators, electrical or ultrasonic brushes, cleaning or rinsing, varnish applications, antimicrobial agents, but mainly imperative necessity for oral health is the enthusiasm of the patient itself.^[14] Many of the mouthwashes are recommended and Chlorhexidine is one such that diminish oral bacterial load and it is used in different forms with bacteriostatic effects. Even it is valuable in diminishing plaque by restrictive adhesion between bacteria and enamel that further affects the formation of enamel film.^[15]

It has been reported that use of fluoridated mouthwashes on a daily basis with sodium fluoride causing momentous dwindle in the progress of carious lesion in and around and beneath the bands. Benson through his systematic review recommends the daily use of 0.05% NaF mouthwash in order to prevent or arrest the enamel demineralization during fixed orthodontic treatment.^[15,16] But benefit for improved and better oral hygiene depends upon the oral state of the individual, physical agility, standard of living, enthusiasm, acquaintance, oral hygiene education, or aids. But the most frequent and widely acceptable mechanical method of plaque control at home is tooth brushing. There is sizeable confirmation that illustrate with tooth brushing plaque and gingivitis can be proscribed consistently, provided cleaning should be adequately thorough and execute at suitable intervals. Hence, this study was conducted with an aim to analyze the efficacy of different oral prophylactic methods performed at home during fixed orthodontic mechanotherapy.

Methodology

The study was conducted in Department of Orthodontic and Dentofacial Orthopaedics of Dental College of Rajasthan to analyze the antimicrobial efficacy of different oral prophylactic methods performed at home during fixed orthodontic mechanotherapy.

Sample selection: - Ninety orthodontic patients, who were undergoing fixed orthodontic mechanotherapy with 0.022" MBT; who agreed to be the part of the study were randomly selected after taking the informed consent. Patient selection was done based upon the following inclusion and exclusion criteria:

Inclusion criteria:-

- Patients undergoing fixed orthodontic mechanotherapy with 0.022"MBT
- Conventional metal brackets.
- Patients with age group 18-40 years.
- No inflammation of gingiva
- Patients with maloccluded teeth
- Patients of crowding(Little Irregularity Index)from 0mm(perfect alignment) to 7-9mm(severe irregularity)

Exclusion criteria:-

- Patients with very severe crowding 10 mm or more (Little Irregularity Index)
- History of previous orthodontic treatment
- Patients with systemic disorders
- Tobacco chewers
- Pregnant patients and lactating women
- Users of systemic medication for chronic disease
- Patient who have undergone periodontal treatment

Selected patients were mainly divided into 2 groups;

Group I those Patients who were undergoing the treatment through elastic modules for ligating the arch wire to bracket of the patients

Group II where Stainless Steel ligature wire was used for ligating the arch wire to brackets of patients.

They were further divided into three subgroups who were using different oral prophylactic methods performed at home as follows:

Subgroup A:-Brushing the teeth with orthodontic brush two times a day followed by mouth rinse once at night with alcohol free mouthwash (Listerine) for 30 days.

Subgroup B:-Brushing the teeth with normal brush followed by using orthodontic floss two times a day and mouth rinse once at night with alcohol free mouthwash (Listerine) for 30 days.

Subgroup C (Control):-Brushing the teeth with normal brush two times a day followed by mouth rinse with normal water for 30 days.

Clinical procedure:The patients were called on the first day (T0) and a two-tone dye solution was applied to the labial surface of all teeth and left for 20 seconds and then rinsed and the tooth surface was dried and isolation was also maintained. Quigely Hein Plaque Index (William Quigely 1962) was being recorded using WHO Probe. The disclosing agent was removed from the tooth surface. Bonding was done and initial arch wire was placed into the bracket slot. Standard oral hygiene instructions were provided to all of the patients and samples of the modules were collected and checked for the following :

- a. 1st day (T0) - Quigely Hein Plaque Index was performed before bonding procedure.
- b. 2nd day (T1) - Bracket Bond Plaque Index was performed after one day of bracket bonding procedure.
- c. 30th day (T2) - Quigely Hein Plaque Index and Bracket Bond Plaque Index was performed after 30th days of bonding procedure.

Statistical analysis:-The data was coded and entered into Microsoft Excel spreadsheet and analysis was done using SPSS version 20 where descriptive statistics included computation of means and standard deviations and Wilcoxon and Kruskal Wallis tests were used at 5% significance level.

RESULTS:-

The present study was conducted for analyzing the antimicrobial efficacy of different oral prophylactic methods performed at home during fixed orthodontic mechanotherapy in both elastomeric modules and stainless steel ligature groups. The sample size consisted of 90 patients which were then divided into 3 subgroups on the basis of different oral hygiene prophylactic methods groups consisting of -

- 1) Orthodontic brushes followed by rinses with Listerine mouthwash,
- 2) Normal brush followed by orthodontic floss and rinses with Listerine mouthwash and
- 3) Prophylaxis with help of normal brushes rinses with normal water.

The efficacy of oral prophylactic aids was analyzed from baseline i.e 1st day to 2nd day and after 30 days for streptococcus mutans and lactobacillus bacterial count using stuart media laboratory procedures.

1: Mean comparison of microbial count among both of the Stainless Steel and Elastic module groups at different time interval in subgroup A (orthodontic brush + mouth rinse with Listerine mouthwash)

The results revealed a comparative analysis of microbial counts between two groups, the Elastic module group and the Stainless Steel group, over different time intervals within Subgroup A, where participants followed an orthodontic brush and mouth rinse regimen with Listerine mouthwash. The microbial counts were measured for Streptococcus Mutans and Lactobacillus bacteria.

In summary, the results suggest that the Elastic module group consistently exhibited higher microbial counts for both Streptococcus Mutans and Lactobacillus compared to the Stainless Steel group, with statistically significant differences observed at various time points post-intervention. These findings indicate a potential impact of the orthodontic brush and mouth rinse with Listerine mouthwash regimen on microbial proliferation, with the Elastic module group showing a more pronounced effect.

2: Mean comparison of microbial count among both of the Stainless Steel and Elastic module groups at different time interval in subgroup B (normal brush + orthodontic floss + mouth rinse with Listerine mouthwash)

The results revealed a comparison of microbial counts between two groups, the Elastic module group and the Stainless Steel group, over different time intervals within Subgroup B, where participants followed a regimen involving normal brushing, orthodontic flossing, and mouth rinse with mouthwash. The microbial counts were measured for Streptococcus Mutans and Lactobacillus bacteria.

In summary, the results suggest that the Elastic module group consistently exhibited higher microbial counts for both Streptococcus Mutans and Lactobacillus compared to the Stainless Steel group, with statistically significant differences observed at various time points post-intervention. These findings indicate a potential impact of the normal brushing, orthodontic flossing, and mouth rinse with Listerine mouthwash regimen on microbial proliferation, with the Elastic module group showing a more pronounced effect.

3: Mean comparison of microbial count among both of the Stainless Steel and Elastic module groups at different time interval in subgroup C (normal brush + mouth rinse with normal water)

The results revealed a comparison of microbial counts between two groups, the Elastic module group and the Stainless Steel group, over different time intervals within Subgroup C, where participants followed a regimen involving normal brushing and mouth rinse with normal water. The microbial counts were measured for Streptococcus Mutans and Lactobacillus bacteria.

In summary, the results indicate that the Elastic module group consistently exhibited higher microbial counts for both Streptococcus Mutans and Lactobacillus compared to the Stainless Steel group, with statistically significant differences observed at various time points post-intervention. These findings suggest a potential influence of the normal brushing and mouth rinse with normal water regimen on microbial proliferation, with the Elastic module group showing a more pronounced effect.

4: Intersubgroup Antimicrobial Efficacy of Orthodontic Brushes and orthodontic floss in patients with Elastomeric Rings and Stainless Steel Ligature Wires - Streptococcus Mutans and Lactobacillus

The results and efficacy for orthodontic brushes and orthodontic floss for streptococcus mutans & lactobacillus in both the orthodontic ligation technique were found to be statistically significant ($p < .05$) from baseline (T0) to 1ST day (T1) as well as on 30th day (T2), but Orthodontic brush is more effective than normal brush along with Orthodontic floss in reducing Streptococcus mutans and lactobacillus count.

Table 01: Mean comparison of microbial count among both of the Stainless Steel and Elastic module groups at different time interval in subgroup A (orthodontic brush + mouth rinse with Listerine mouthwash)

Group	Time interval	Mean	Std. Deviation	Std Error Mean	Mean Diff	t value	p value
Streptococcus Mutans							
Elastic module	T0	40.17	17.889	3.266	0.400	0.100	0.05**
Stainless steel		30.57	12.811	2.339			
Elastic module	T1	64.63	22.940	4.188	22.533	4.508	0.03*
Stainless steel		42.10	14.942	2.728			
Elastic module	T2	67.83	17.511	3.197	20.73	3.792	0.000*
Stainless steel		47.10	12.095	2.208			
Lactobacillus							
Elastic module	T0	54.93	30.144	5.504	22.933	4.009	0.07**
Stainless steel		22.00	8.554	1.562			
Elastic module	T1	72.40	22.710	4.146	40.667	9.093	0.02*
Stainless steel		31.73	9.184	1.677			
Elastic module	T2	87.03	39.937	7.291	44.733	5.202	0.001*
Stainless steel		67.30	68.264	61.509			

*statistically significant

**statistically non- significant

Table 2: Mean comparison of microbial count among both of the Stainless Steel and Elastic module groups at different time interval in subgroup B (normal brush + orthodontic floss + mouth rinse with Listerine mouthwash)

Group	Time interval	Mean	Std. Deviation	Std Error Mean	Mean Diff	t value	p value
Streptococcus Mutans							
Elastic module	T0	46.87	16.990	3.102	15.800	4.351	0.07**
Stainless steel		11.07	10.342	1.888			
Elastic module	T1	50.07	17.043	3.112	19.500	5.700	0.002*
Stainless steel		19.57	7.785	1.421			
Elastic module	T2	56.73	14.941	2.728	30.467	6.380	0.001*
Stainless steel		26.27	9.244	1.688			
Lactobacillus							
Elastic module	T0	65.63	15.332	2.799	25.200	8.186	0.05**
Stainless steel		19.43	7.016	1.281			
Elastic module	T1	66.17	14.037	2.563	25.300	9.278	0.04*
Stainless steel		20.87	5.104	.932			
Elastic module	T2	74.30	14.157	2.585	36.933	9.479	0.000*
Stainless steel		37.37	6.462	1.180			

*statistically significant

**statistically non- significant

Table 3: Mean comparison of microbial count among both of the Stainless Steel and Elastic module groups at different time interval in subgroup C (normal brush + mouth rinse with normal water)

Group	Time interval	Mean	Std. Deviation	Std Error Mean	Mean Diff	t value	p value
Streptococcus Mutans							
Elastic module	T0	67.73	11.383	2.078	9.233	2.577	.005**
Stainless steel		48.50	15.987	2.919			
Elastic module	T1	70.73	10.920	1.994	12.633	3.534	.003*
Stainless steel		58.10	16.251	2.967			
Elastic module	T2	77.20	10.614	1.938	16.900	3.235	.001*
Stainless steel		60.30	15.100	2.757			
Lactobacillus							
Elastic module	T0	69.97	13.523	2.469	10.267	3.773	.08**
Stainless steel		56.70	6.271	1.145			
Elastic module	T1	71.53	13.093	2.390	15.133	5.657	.003*
Stainless steel		59.40	6.579	1.201			
Elastic module	T2	87.73	11.855	2.164	23.233	5.404	.002*
Stainless steel		69.50	6.274	1.145			

*statistically significant

**statistically non- significant

Table4: Intergroup comparison of various parameters among both of the groups

	GP	N	Mean	Std. Deviation	Std. Err or Mean	T value	P value	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
T0 Streptococcus OrthoBrush	Elastomeric Module	45	40.17	17.889	3.266	-1.100	.009*	-.400	4.017	Lower	Upper
	Stainless Steel	45	40.57	12.811	2.339					-8.441	7.641
T1 Streptococcus OrthoBrush	Elastomeric Module	45	64.63	22.940	4.188	4.508	.000*	22.533	4.998	-8.459	7.659
	Stainless Steel	45	42.10	14.942	2.728					12.528	32.539
T2 Streptococcus OrthoBrush	Elastomeric Module	45	37.83	17.511	3.197	3.792	.000*	14.733	3.886	12.493	32.574
	Stainless Steel	45	23.10	12.095	2.208					6.956	22.511
T0 Lactobacillus OrthoBrush	Elastomeric Module	45	54.93	30.144	5.504	4.009	.000*	22.933	5.721	6.935	22.532
	Stainless Steel	45	32.00	8.554	1.562					11.482	34.385
T1 Lactobacillus OrthoBrush	Elastomeric Module	45	72.40	22.710	4.146	9.093	.000*	40.667	4.473	11.303	34.564
	Stainless Steel	45	31.73	9.184	1.677					31.714	49.619
T2 Lactobacillus OrthoBrush	Elastomeric Module	45	57.03	39.937	7.291	5.202	.000*	38.733	7.446	31.614	49.719

	GP	N	Mean	Std. Deviation	Std. Error or Mean	T value	P value	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
	Stainless Steel	45	18.30	8.264	1.509					23.829	53.638
T0 Streptococcus Normal Brush + Normal Water	Elastomeric Module	45	67.73	11.383	2.078	2.577	.003*	9.233	3.583	23.557	53.910
	Stainless Steel	45	58.50	15.987	2.919					2.061	16.406
T1 Streptococcus Normal Brush + Normal Water	Elastomeric Module	45	70.73	10.920	1.994	3.534	.001*	12.633	3.575	2.045	16.422
	Stainless Steel	45	58.10	16.251	2.967					5.478	19.789
T2 Streptococcus Normal Brush + Normal Water	Elastomeric Module	45	67.20	10.614	1.938	3.235	.002*	10.900	3.370	5.456	19.810
	Stainless Steel	45	56.30	15.100	2.757					4.155	17.645
T0 Lactobacillus Normal Brush + Normal Water	Elastomeric Module	45	69.97	13.523	2.469	3.773	.001*	10.267	2.721	4.138	17.662
	Stainless Steel	45	59.70	6.271	1.145					4.819	15.714
T1 Lactobacillus Normal Brush + Normal Water	Elastomeric Module	45	71.53	13.093	2.390	5.657	.001*	15.133	2.675	4.770	15.763
	Stainless Steel	45	56.40	6.579	1.201					9.778	20.488
T2 Lactobacillus Normal Brush + Normal Water	Elastomeric Module	45	69.73	11.855	2.164	5.404	.000*	13.233	2.449	9.737	20.529
	Stainless Steel	45	56.50	6.274	1.145					8.331	18.135

	GP	N	Mean	Std. Deviation	Std. Error or Mean	T value	P value	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
T0 Streptococcus Normal Brush +OrthoFloss	Elastomeric Module	45	56.87	16.990	3.102	4.351	.000*	15.800	3.631	8.298	18.169
	Stainless Steel	45	41.07	10.342	1.888					8.531	23.069
T1 Streptococcus Normal Brush +OrthoFloss	Elastomeric Module	45	59.07	17.043	3.112	5.700	.000*	19.500	3.421	8.498	23.102
	Stainless Steel	45	39.57	7.785	1.421					12.652	26.348
T2 Streptococcus Normal Brush +OrthoFloss	Elastomeric Module	45	56.73	14.941	2.728	6.380	.000*	20.467	3.208	12.589	26.411
	Stainless Steel	45	36.27	9.244	1.688					14.046	26.888
T0 lactobacillus Normal Brush +OrthoFloss	Elastomeric Module	45	65.63	15.332	2.799	8.186	.000*	25.200	3.078	14.018	26.915
	Stainless Steel	45	40.43	7.016	1.281					19.038	31.362
T1 lactobacillus Normal Brush +OrthoFloss	Elastomeric Module	45	66.17	14.037	2.563	9.278	.000*	25.300	2.727	18.981	31.419
	Stainless Steel	45	40.87	5.104	.932					19.841	30.759
T2 lactobacillus Normal Brush +OrthoFloss	Elastomeric Module	45	64.30	14.157	2.585	9.479	.000*	26.933	2.841	19.772	30.828
	Stainless Steel		37.37	6.462	1.180					21.246	32.621

Table 5: Descriptive statistics of various parameters in the group **Elastomeric Modules** group

	GP	N	Mean	Std.Deviation	Std.ErrorMean
T0Streptococcus	OrthoBrush	15	40.17	17.889	3.266
	NormalBrush	15	67.73	11.383	2.078
	NormalBrushfloss	15	56.87	16.990	3.102
T1Streptococcus	OrthoBrush	15	64.63	22.940	4.188
	NormalBrush	15	70.73	10.920	1.994
	NormalBrushfloss	15	59.07	17.043	3.112
T2Streptococcus	OrthoBrush	15	37.83	17.511	3.197
	NormalBrush	15	67.20	10.614	1.938
	NormalBrushfloss	15	56.73	14.941	2.728
T0Lactobacillus	OrthoBrush	15	54.93	30.144	5.504
	NormalBrush	15	69.97	13.523	2.469
	NormalBrushfloss	15	65.63	15.332	2.799
T1Lactobacillus	OrthoBrush	15	72.40	22.710	4.146
	NormalBrush	15	71.53	13.093	2.390
	NormalBrushfloss	15	66.17	14.037	2.563
T2Lactobacillus	OrthoBrush	15	57.03	39.937	7.291
	NormalBrush	15	69.73	11.855	2.164
	NormalBrushfloss	15	64.30	14.157	2.585

*statistically significant

**statistically non-significant

Table6:Intergroupcomparison ofvariousparametersin theElastomericModules group

Group		Sum of Squares	df	Mean Square	F	P value
T0Streptococcus	BetweenGroups	11568.956	2	5784.478	23.506	.000*
	WithinGroups	21409.500	87	246.086		
	Total	32978.456	89			
T1Streptococcus	BetweenGroups	2043.089	2	1021.544	3.274	.04*
	WithinGroups	27142.700	87	311.985		
	Total	29185.789	89			
T2Streptococcus	BetweenGroups	13291.622	2	6645.811	31.030	.000*
	WithinGroups	18632.833	87	214.170		
	Total	31924.456	89			
T0lactobacillus	BetweenGroups	3592.689	2	1796.344	4.062	.021*
	WithinGroups	38471.800	87	442.205		
	Total	42064.489	89			
T1lactobacillus	BetweenGroups	684.067	2	342.033	1.160	.318**
	WithinGroups	25642.833	87	294.745		
	Total	26326.900	89			
T2lactobacillus	BetweenGroups	2436.156	2	1218.078	1.888	.158**
	WithinGroups	56141.133	87	645.300		
	Total	58577.289	89			

Table7:Multiplegroupcomparison ofvariousparametersin theElastomericModules group

Dependent Variable	(I)GP	(J)GP	Mean Difference(I-J)	Std.E rror	p value	95% Confidence Interval	
						Lower Bound	Upper Bound
T0 Strepto Coccus	Ortho Brush	Normal Brush	-27.567	4.050	.000*	-37.45	-17.68
		Normal Brusfloss	-16.700	4.050	.000*	-26.59	-6.81
	Normal Brush	Ortho Brush	27.567	4.050	.000*	17.68	37.45
		Normal Brushfloss	10.867	4.050	.026*	.98	20.75
	NormalB rufloss	Ortho Brush	16.700	4.050	.000*	6.81	26.59
		Normal Brush	-10.867	4.050	.026*	-20.75	-.98
T1 Strepto Coccus	Ortho Brush	Normal Brush	-6.100	4.561	.554**	-17.23	5.03
		Normal Brusfloss	5.567	4.561	.677**	-5.57	16.70
	Normal Brush	Ortho Brush	6.100	4.561	.554**	-5.03	17.23
		Normal Brushfloss	11.667	4.561	.037*	.53	22.80
	NormalB rufloss	Ortho Brush	-5.567	4.561	.677**	-16.70	5.57
		Normal Brush	-11.667	4.561	.037*	-22.80	-.53
T2 Strepto Coccus	Ortho Brush	Normal Brush	-29.367	3.779	.000*	-38.59	-20.14
		Normal Brush Floss	-18.900	3.779	.000*	-28.12	-9.68
	Normal Brush	Ortho Brush	29.367	3.779	.000*	20.14	38.59
		Normal Brush Floss	10.467	3.779	.021*	1.24	19.69
	Normal Brush floss	Ortho Brush	18.900	3.779	.000*	9.68	28.12
		Normal Brush	-10.467	3.779	.021*	-19.69	-1.24
T0Lacto bacillus	Ortho Brush	Normal Brush	-15.033	5.430	.021*	-28.29	-1.78
		Normal Brush Floss	-10.700	5.430	.156**	-23.95	2.55
	Normal	Ortho Brush	15.033	5.430	.021*	1.78	28.29

Dependent Variable	(I)GP	(J)GP	Mean Difference(I-J)	Std.E rror	p value	95% Confidence Interval	
						Lower Bound	Upper Bound
	Brush	Normal Brush Floss	4.333	5.430	1.000**	-8.92	17.59
		Ortho Brush	10.700	5.430	.156**	-2.55	23.95
	Normal Brush floss	Normal Brush	-4.333	5.430	1.000**	-17.59	8.92
		Ortho Brush					
T1Lacto bacillus	Ortho Brush	Normal Brush	.867	4.433	1.000**	-9.95	11.69
		Normal Brush Floss	6.233	4.433	.490**	-4.59	17.05
	Normal Brush	Ortho Brush	-.867	4.433	1.000**	-11.69	9.95
		Normal Brush Floss	5.367	4.433	.688**	-5.45	16.19
	Normal Brush floss	Ortho Brush	-6.233	4.433	.490**	-17.05	4.59
		Normal Brush	-5.367	4.433	.688**	-16.19	5.45
T2Lacto bacillus	Ortho Brush	Normal Brush	-12.700	6.559	.168**	-28.71	3.31
		Normal Brush Floss	-7.267	6.559	.813**	-23.28	8.74
	Normal Brush	Ortho Brush	12.700	6.559	.168**	-3.31	28.71
		Normal Brush Floss	5.433	6.559	1.000**	-10.58	21.44
	Normal Brush floss	Ortho Brush	7.267	6.559	.813**	-8.74	23.28
		Normal Brush	-5.433	6.559	1.000**	-21.44	10.58

*statistically significant

**statistically non-significant

Table8:Descriptivestatisticsofvariousparametersin theStainLessSteelLigatureWire group

	GP	N	Mean	Std. Deviation	Std.Error Mean
T0 Streptococcus	Ortho Brush	15	40.57	12.811	2.339
	Normal Brush	15	58.50	15.987	2.919
	Normal Brushfloss	15	41.07	10.342	1.888
T1 Streptococcus	Ortho Brush	15	42.10	14.942	2.728
	Normal Brush	15	58.10	16.251	2.967
	Normal Brushfloss	15	39.57	7.785	1.421
T2 Streptococcus	Ortho Brush	15	23.10	12.095	2.208
	Normal Brush	15	56.30	15.100	2.757
	Normal Brushfloss	15	36.27	9.244	1.688
T0 Lactobacillus	Ortho Brush	15	32.00	8.554	1.562
	Normal Brush	15	59.70	6.271	1.145
	Normal Brushfloss	15	40.43	7.016	1.281
T1 Lactobacillus	Ortho Brush	15	31.73	9.184	1.677
	Normal Brush	15	56.40	6.579	1.201
	Normal Brushfloss	15	40.87	5.104	.932
T2 Lactobacillus	Ortho Brush	15	18.30	8.264	1.509
	Normal Brush	15	56.50	6.274	1.145
	Normal Brushfloss	15	37.37	6.462	1.180

Table9: Intergroup comparison of various parameters in the Stain Less Steel Ligature Wire group

		Sum of Squares	df	Mean Square	F	p value
T0 Streptococcus	Between Groups	6257.756	2	3128.878	17.823	.000*
	Within Groups	15272.733	87	175.549		
	Total	21530.489	89			
T1 Streptococcus	Between Groups	6059.022	2	3029.511	16.586	.000*
	Within Groups	15890.767	87	182.652		
	Total	21949.789	89			
T2 Streptococcus	Between Groups	16769.356	2	8384.678	54.712	.000*
	Within Groups	13332.867	87	153.251		
	Total	30102.222	89			
T0 Lactobacillus	Between Groups	12096.156	2	6048.078	112.200	.000*
	Within Groups	4689.667	87	53.904		
	Total	16785.822	89			
T1 Lactobacillus	Between Groups	9331.467	2	4665.733	91.084	.000*
	Within Groups	4456.533	87	51.225		
	Total	13788.000	89			
T2 Lactobacillus	Between Groups	21888.622	2	10944.311	219.757	.000*
	Within Groups	4332.767	87	49.802		
	Total	26221.389	89			

*statistically significant

**statistically non-significant

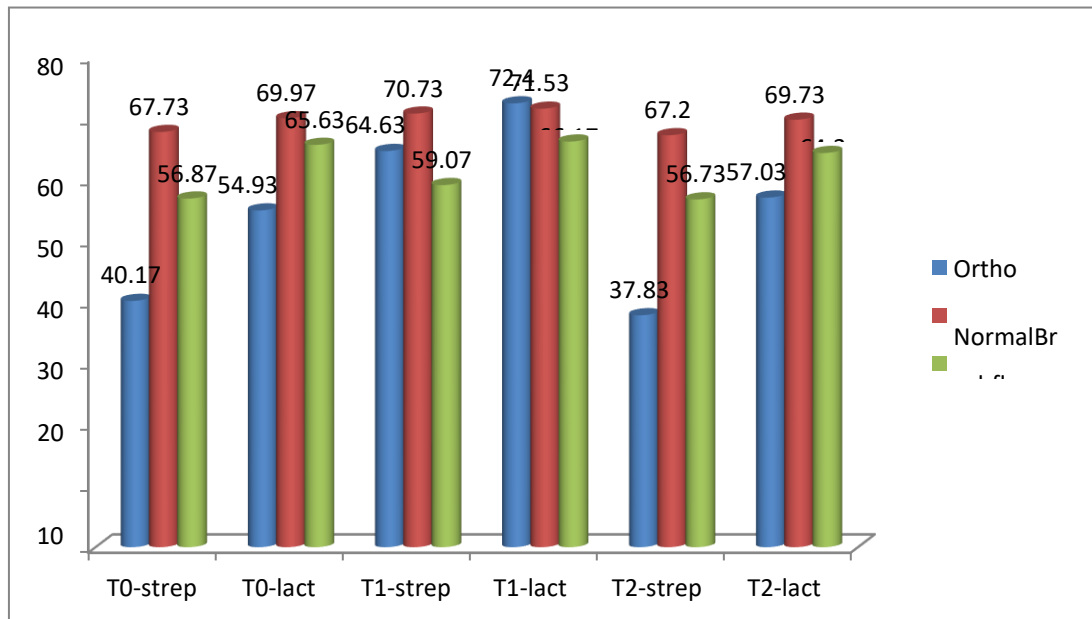
Table10:Multiplegroupcomparison ofvariousparametersin theStainLessSteelLigatureWire group

Dependent Variable	(I)GP	(J)GP	Mean Difference(I-J)	Std. Error	p value	95% Confidence Interval	
						Lower Bound	Upper Bound
T0 Streptococcus	Ortho Brush	Normal Brush	-17.933	3.421	.000*	-26.28	-9.58
		Normal Brusflo	-.500	3.421	1.000**	-8.85	7.85
	Normal Brush	Ortho Brush	17.933	3.421	.000*	9.58	26.28
		Normal Brushflo	17.433	3.421	.000*	9.08	25.78
	Normal Brush floss	Ortho Brush	.500	3.421	1.000**	-7.85	8.85
		Normal Brush	-17.433	3.421	.000*	-25.78	-9.08
T1 Streptococcus	Ortho Brush	Normal Brush	-16.000	3.490	.000*	-24.52	-7.48
		Normal Brusflo	2.533	3.490	1.000**	-5.99	11.05
	Normal Brush	Ortho Brush	16.000	3.490	.000*	7.48	24.52
		Normal Brushflo	18.533	3.490	.000*	10.01	27.05
	Normal Brush floss	Ortho Brush	-2.533	3.490	1.000**	-11.05	5.99
		Normal Brush	-18.533	3.490	.000*	-27.05	-10.01
T2 Streptococcus	Ortho Brush	Normal Brush	-33.200	3.196	.000*	-41.00	-25.40
		Normal Brusflo	-13.167	3.196	.000*	-20.97	-5.36
	Normal Brush	Ortho Brush	33.200	3.196	.000*	25.40	41.00
		Normal Brushflo	20.033	3.196	.000*	12.23	27.84
	Normal Brushfloss	Ortho Brush	13.167	3.196	.000*	5.36	20.97
		Normal Brush	-20.033	3.196	.000*	-27.84	-12.23

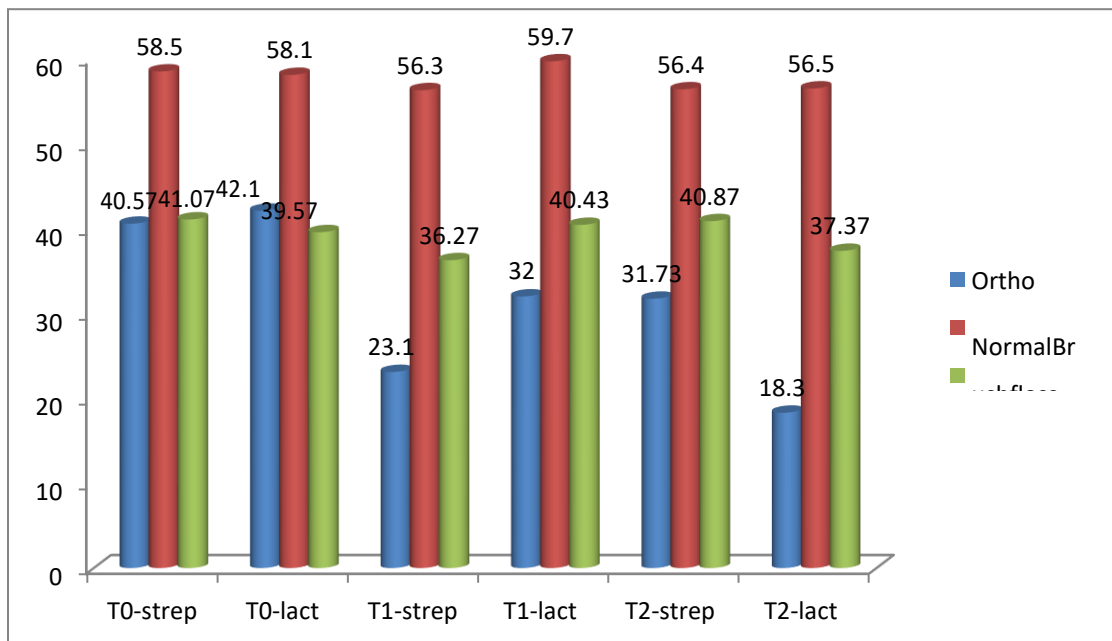
Dependent Variable	(I)GP	(J)GP	Mean Difference(I-J)	Std. Error	p value	95% Confidence Interval	
						Lower Bound	Upper Bound
T0 Lactobacillus	Ortho Brush	Normal Brush	-27.700	1.896	.000*	-32.33	-23.07
		Normal Brusflo	-8.433	1.896	.000*	-13.06	-3.81
	Normal Brush	Ortho Brush	27.700	1.896	.000*	23.07	32.33
		Normal Brushflo	19.267	1.896	.000*	14.64	23.89
	Normal Brushfloss	Ortho Brush	8.433	1.896	.000*	3.81	13.06
		Normal Brush	-19.267	1.896	.000*	-23.89	-14.64
T1 Lactobacillus	Ortho Brush	Normal Brush	-24.667	1.848	.000*	-29.18	-20.16
		Normal Brusflo	-9.133	1.848	.000*	-13.64	-4.62
	Normal Brush	Ortho Brush	24.667	1.848	.000*	20.16	29.18
		Normal Brushflo	15.533	1.848	.000*	11.02	20.04
	Normal Brushfloss	Ortho Brush	9.133	1.848	.000*	4.62	13.64
		Normal Brush	-15.533	1.848	.000*	-20.04	-11.02
T2 Lactobacillus	Ortho Brush	Normal Brush	-38.200	1.822	.000*	-42.65	-33.75
		Normal Brusflo	-19.067	1.822	.000*	-23.51	-14.62
	Normal Brush	Ortho Brush	38.200	1.822	.000*	33.75	42.65
		Normal Brushflo	19.133	1.822	.000*	14.69	23.58
	Normal Brushfloss	Ortho Brush	19.067	1.822	.000*	14.62	23.51
		Normal Brush	-19.133	1.822	.000*	-23.58	-14.69

*statistically significant

**statistically non-significant



Graph1: Intergroup comparison of various parameters in the group Elastomeric Modules Group



Graph2: Intergroup comparison of various parameters in the group Stain Less Steel Ligature Wire group

Discussion

Orthodontic ligation techniques are used to secure the arch wire to the brackets and they comprise of stainless-steel ligatures wires, elastic modules and new system introduce that is self-ligation system. Even various molar bands, brackets, arch wires, elastics, springs or other

attachments are being used while during the Orthodontic treatment and they all have a bigger tendency for accumulation of dental plaque, as they block exposure to good oral hygiene and create microbial nests that result in plaque accumulation. Henceforth there is requirement of enhanced oral hygiene care. This present study was conducted for analyzing the efficacy of different oral prophylactic methods at home during fixed orthodontic mechanotherapy among 60 studied populations of 18-40 years of aged. The patients were treated using elastomeric modules and stainless steel ligature rings with both the groups were advised various prophylactic methods.

The present study revealed that difference was found to be significant for normal brush followed by orthodontic floss at baseline (T0) and T2 (30th Day) when compared between various prophylactic methods. But the study conducted by Quesha L et al revealed that the dental plaque can be effectively controlled through the electric toothbrush and the chlorhexidine mouth rinse together than manual teeth brushing alone^[11,16,17]. Even they have also showed that the electric toothbrush beside the chlorhexidine mouth rinse appears to power dental plaque additionally and effectively than manual teeth brushing alone among the patients who were receiving multibracket treatment.

The study by Caccianiga P^[21] et al also resonate that usage of an oral irrigator along with the sonic toothbrush seems to reinstate good oral hygiene in contrast to pathogenic flora, which further reducing the jeopardy of caries and gingivitis in orthodontic patients Mavami M et al^[22] where they have done the examination of elastomeric modules over a scheduled period of time and seen the normal brushes were also successful module for oral hygiene aid while during fixed mechanotherapy. Irregular alignment of teeth may make plaque control even more difficult. Nonetheless, effective plaque control is the prime consideration for good oral hygiene. Daily oral hygiene can become challenging for some patients in the presence of orthodontic appliances. Accordingly orthodontic toothbrush has been recommended for patients with orthodontic appliances. Oral hygiene instruction and reinstruction must take place during orthodontic treatment. Also some patients need to be reminded to concentrate on cleaning the cervical area of their teeth below the brackets. A continuous increase in oral hygiene awareness not only will reduce the prevalence and severity of iatrogenic tissue damage but also will extend the long-term benefits of orthodontic therapy.

Conclusion

Oral home care aids are the effective methods for improvement of the patient's compliance in order to achieve the optimal oral hygiene results and the current study revealed that orthodontic brushes were more effective over normal brushes. There is a need for careful monitoring of orthodontic patients and taking specific preventive interventions against the risk of development of various plaque associated diseases especially during third month and sixth month of treatment. But education and motivation should also be done to the patients who are undergoing fixed orthodontic treatment.

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