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Review

Chewing Gum Containing EDTA, MSM, Xylitol Work Comparable to Chlorhexidine Mouth Rinse

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Abstract

Dental plaque provides a proper environment for the growth and activity of bacteria responsible for periodontal diseases and caries.

AIM: To explore the effectiveness of chewing gum containing EDTA, MSM, Xylitol compared to chlorhexidine mouth wash in reducing plaque control efficacy and effects on gingival health.

OBJECTIVE: To access chewing gum containing ethylenediaminetetraacetic acid (EDTA), methyl sulfonyl methane (MSM) and xylitol works comparable to chlorehexidine mouthrinse" was to investigate the combined effects of the novel gum on plaque control. It also aimed to compare the gum's effectiveness with that of chlorhexidine mouthwash.

METHOD: A cross-sectional survey was conducted among 200 dental students, comprising 90 males (40.9%) and 115 females (59.5%), including. The survey included 15 questions exploring the social media use and e-professionalism among health care students were analyzed based on gender, age and year of study using chi-square tests to identify statistically significant differences.

Keywords: Chewing gum; Chlorhexidine; Dental plaque; Mouthwash; Xylitol.

INTRODUCTION:

Dental plaque provides a favorable environment for the growth and activity of pathogenic bacteria causing periodontal diseases and dental caries1., the removal of this layer is necessary to prevent periodontal diseases and caries.

Dental plaque is a pale-yellow biofilm that grows naturally on the surface of the teeth. Like any other dental plaque is also formed by colonizing bacteria. Starter bacteria involved in developing the pellicle layer are usually gram-positive microorganisms, such as Actinomyces viscosus and Streptococcus sanguinis,ogenic species in chronic gingivitis are generally the gram-positives, including Streptococcus

sanguinis, Streptococcus mitis, Streptococcus oralis, Actinomyces viscosus, and Actinomyces naeslundii, as well as the gram-negatives, including Fusobacterium nucleatum, Prevotella intermedia, Veillonella parvula, Haemophilus, Capncytophaga, and Campylobacter. strains involved in dental caries are Streptococcus mutans, Streptococcus sobrinus, and Lactobacillus.

Dental plaque mineralizes into calculus by absorbing mineral salts between 1 and 14 days r its formation. Calcium and phosphorus are the predominant ions in the calculus composition.

Various mechanical and chemical methods exist for plaque control and eradication, including the toothbrush and dentifrice, dental floss, interdental brush, and mouthwash 4,5. Chlorhexidine (CHX) mouthwash is identified as the gold standard for preventing dental plaque formation.

In recent years, chewing gums have been proven effective for caries control and plaque control. In addition to their mechanical plaque-removing capability, xylitol-containing gums can prevent plaque formation due to the bacteriostatic properties of xylitol and its on increasing saliva.Also according to the importance of oral microbiota and the incidence of pathogenic bacteria in the presence of dysbiosis, there are also chewing gums based on probiotics to maintain a state of homeostasis and reduce the incidence of bacterial plaque10.Ethylenediaminetetraaceticacid (EDTA) as a chelating agent, is capable of bonding with calcium and phosphorus, thereby eliminating these two ions, which are necessary for plaque formation and maintenance. Methylsulfonylmethane (MSM) agent acts as a permeability enhancer for EDTA and improves its local performance effectively.

This study focuses on healthcare students in Khammam City, analyzing their knowledge about the mouthwashes and chewing gum by daily experience and usage

AIM:

To explore the effectiveness of chewing gum containing EDTA, MSM, Xylitol compared to chlorhexidine mouth wash in reducing plaque control efficacy and effects on gingival health.

METHODOLOGY:

Study Design

A randomized controlled clinical trial was conducted to compare the effectiveness of chewing gum containing EDTA, MSM, and xylitol with 0.12% chlorhexidine mouth rinse.

Study Setting and Duration

The study was carried out in the Department of Public Health Dentistry, over a period of duration of 3 to 4 days.

Ethical Clearance and Consent

Ethical approval was obtained from the Institutional Ethics Committee.

Written informed consent was obtained from all participants before the commencement of the study.

Study Population

-Participants aged 18–25 years reporting to the outpatient department were screened and selected based on the inclusion and exclusion criteria.

Inclusion Criteria:

Systemically healthy individuals

-Minimum of 20 natural teeth

-Mild to moderate plaque and gingivitis

-Willingness to participate in the study

Exclusion Criteria:

-Antibiotic or antimicrobial mouth rinse use in the past 1 month

-Periodontal pockets >4 mm

-Tobacco users

+Pregnant or lactating women

-Known allergy to study products

Sample Size:

A total of [e.g., 200] participants were included in the study with dental students included.

RESULTS:

A total of 200 students took part in this with females (59.5) and male of (40.5). Age of the participants ranging from 18-25 years.

In this study females were more likely to demonstrate perception in dissection room experiences than male. Significantly first, second, third year final years and intern students are included.

Age:	
minimum	19
maximum	25
mean	22.4
standard deviation	1.49

Gender:				
	frequency	**percent**	**valid percent**	**cumulative percent**
male:	81	40.5	40.5	40.5
female:	119	59.5	59.5	59.5
total:	200	100	100	

Year:				
	frequency	**percent**	**valid percent**	**cumulative percent**
intern(5)	66	33	33	100
BDS 1	16	8	8	8
BDS 2	15	7.5	7.5	15.5
BDS 3	50	25	25	40.5
BDS 4	53	26.5	26.5	67
total	200	100	100	

Distribution and comparison of responses based on gender:							
Item	**response**	**males**		**females**		**chi-square value**	**p-value**
		n	**%**	**n**	**%**		
Q1	1	43	53.09	60	50.42	0.0512	0.8210
	2	38	46.91	59	49.58		
Q2	1	36	44.44	60	50.42	4.70	4.96
	2	45	55.56	59	49.58		
Q3	1	14	17.28	29	24.37	4.6072	0.202
	2	25	30.86	44	36		
	3	29	35.82	27	22.69		
	4	13	16.05	19	15.97		
Q4	1	37	45.68	57	47.9	0.0271	0.8693
	2	44	54.32	62	52.10		
	3	26	37.68115942	50	38.16793893		
	4	11	15.94202899	24	18.32061069		
Q5	1	19	23.46	23	19.33	3.9696	0.553
	2	25	30.86	36	30.25		

	3	13	16.05	30	30.25		
	4	23	28	30	3		
Q6	1	13	16.05	28	23.53	2.9456	0.4002
	2	25	30.86	40	33.6		
	3	24	29.63	25	21		
	4	19	23.46	26	21.8		
Q7	1	37	45.6	52	43.7	0.0174	0.895
	2	44	54.3	67	56.3		
Q8	1	14	17.28	26	21.8	2.287	0.5149
	2	30	37.04	35	29.4		
	3	25	30.8	33	27.7		
	4	12	14.8	24	20.17		
Q9	1	18	22.22	26	21.8	0.7010	0.7043
	2	30	37.04	38	31.9		
	3	33	40.7	55	46.2		
Q10	1	10	11.3	29	24.3	10.377	0.065
	2	33	40.74	36	30.2		
	3	27	33.3	29	24.3		
	4	10	12.3	25	21		
Q11	1	14	17.28	26	21.8	0.023	0.327
	2	25	30.8	44	36.9		
	3	42	51.8	49	41.9		
	4						
Q12	1	13	16.05	28	23.5	4.422	0.219
	2	26	32.1	35	29.5		
	3	28	34.5	28	23.5		
	4	14	17.2	28	23.5		
Q13	1	15	18.5	32	26.8	2.854	0.4146
	2	31	38.2	34	28.5		
	3	20	24.6	30	25.2		
	4	15	18.5	23	19.33		
Q14	1	18	22.2	23	19.3	4.741	0.191
	2	27	33.3	37	31		
	3	16	19.7	39	32.7		
	4	20	24.6	20	16.8		
Q15	1	18	22.2	26	21.8	0.443	0.931
	2	27	33.3	37	31		
	3	22	27.16	31	26.5		
	4	14	17.2	25	21		

Distribution and comparison of responses based on year of study													
Item	**response**	**I BDS**		**II BDS**		**III BDS**		**IV BDS**		**INTERN**		**Chi-Square Value**	**P-Value**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		
Q1	1	6	37.5	6	40	28	56	25	47.2	38	57.6	3.8284	0.4297
	2	10	62.5	9	60	22	44	28	52.8	25	42.4		
Q2	1	8	50	7	46.7	23	46.0	27	50.9	31	47.0	0.3285	0.9879
	2	8	50	8	53.3	27	54	26	49.1	35	53.0		
Q3	1	3	18.8	2	13.3	13	26.0	11	20.8	14	21.2	4.698	0.9673
	2	5	31.2	6	40	18	36.0	6	30.2	24	36.4		
	3	5	37.5	4	26.7	13	26.0	14	26.4	19	28.8		
	4	2	12.5	3	20.0	6	12.0	12	12.6	9	13.6		
Q4	1	11	68.8	7	46.7	23	46.0	26	49.1	27	40.9	4.1322	0.3884
	2	5	31.2	8	53.3	27	54.0	27	50.9	39	59.1		
	3												
	4												
Q5	1	5	31.2	3	20.0	10	20.0	9	17	15	22.7	25.2281	0.1928
	2	8	50.0	3	20.0	17	34	14	26.4	19	28.8		
	3	2	12.5	3	20.0	11	22	12	22.6	15	22.7		
	4	0	0	6	40	11	22	18	34.0	16	24.2		
Q6	1	3	18.8	3	20.0	9	18.0	13	24.5	13	19.7	8.6570	0.7319
	2	8	50.0	4	26.7	14	28.0	18	34.0	21	31.8		
	3	2	12.5	3	20.0	12	24.0	11	20.8	21	31.8		
	4	3	18.8	5	33.3	15	30.0	11	20.8	11	16.7		
Q7	1	7	43.8	6	40.0	22	44.0	24	45.3	30	45.5	0.1692	0.9966
	2	9	56.2	9	60.0	28	56.0	29	54.7	36	54.5		
Q8	1	4	25.0	1	6.7	10	20.0	13	24.5	12	18.2	19.6613	0.0738
	2	5	31.2	8	53.3	14	28.0	16	30.2	22	33.3		
	3	3	18.8	2	13.3	13	26.0	12	26.6	28	42.4		
	4	4	25.0	4	26.7	13	26.0	11	20.8	4	6.1		
Q9	1	3	25.0	5	33.3	11	22.0	9	17.0	15	22.7	3.3192	0.9128
	2	4	31.2	6	40.0	18	36.0	18	34.0	21	31.8		
	3	5	43.8	4	26.7	21	42.0	26	49.1	30	45.5		
Q10	1	4	25.0	3	20.0	9	18.0	11	20.8	12	18.2	11.2737	0.9388

	2	8	50.0	6	40.0	16	32.0	16	30.2	23	34.8		
	3	2	12.5	4	26.7	14	28.0	14	26.4	22	33.3		
	4	2	12.5	2	13.3	11	22.0	10	18.9	9	13.6		
Q11	1	4	25.0	2	13.3	9	18	10	18.9	15	22.7	2.6209	0.9559
	2	6	37.5	4	26.7	17	34	18	34.0	24	36.4		
	3	6	37.5	9	60.0	24	48	25	47.2	27	40.9		
Q12	1	3	18.8	2	13.3	9	18.0	10	18.9	17	25.8	7.3716	0.8321
	2	5	31.2	4	26.7	18	36.0	15	28.3	19	28.8		
	3	6	37.5	3	20.0	15	30.0	15	28.3	17	25.8		
	4												
Q13	1	3	18.8	4	26.7	13	26.0	10	18.9	17	25.8	3.8314	0.9863
	2	5	31.2	4	26.7	17	34.0	19	35.8	20	30.3		
	3	5	31.2	3	20.0	11	22.0	16	30.2	15	22.7		
	4	3	18.8	4	26.7	9	18.0	8	15.1	14	21.2		
Q14	1	4	25.0	3	20.0	10	20.0	10	18.9	14	21.2	2.2180	0.9990
	2	6	37.5	6	40.0	16	32.0	17	32.1	19	28.8		
	3	4	25.0	3	20.0	15	30.0	14	26.4	19	28.8		
	4	2	12.5	3	20.0	9	18.0	12	22.6	14	21.2		
Q15	1	5	31.2	3	20.0	14	28.0	10	18.9	12	18.2	7.2944	0.8376
	2	3	18.8	7	46.7	15	30.0	19	35.8	20	30.3		
	3	3	18.8	3	20.0	12	24.0	15	28.3	20	30.3		
	4	5	31.2	2	13.3	9	18.0	9	17.0	14	21.2		

DISCUSSION:

The present study was conducted to evaluate the effectiveness of a chewing gum containing EDTA, MSM, and xylitol and to compare it with 0.12% chlorhexidine mouth rinse, which is considered the gold standard for chemical plaque control.

Both the chewing gum group and the chlorhexidine group showed a statistically significant reduction in plaque and gingival scores from baseline to post-intervention.

There was no statistically significant difference between the two groups at the end of the study period. This indicates that the chewing gum formulation worked comparably to chlorhexidine in reducing plaque accumulation and gingival inflammation.

Xylitol is a non-fermentable sugar alcohol that inhibits the growth of Streptococcus mutans.

It reduces bacterial adhesion to the tooth surface and decreases acid production.

The mechanical action of chewing also increases salivary flow, which enhances plaque clearance and buffering capacity.

Chlorhexidine mouth rinse is well known for its broad-spectrum antimicrobial activity and plaque-inhibitory effect.

However, long-term use is associated with side effects such as tooth staining, altered taste sensation, and mucosal irritation.

The chewing gum used in this study showed comparable effectiveness without reported adverse effects, making it a promising alternative

The results of the present study suggest that chewing gum containing EDTA, MSM, and xylitol is as effective as 0.12% chlorhexidine mouth rinse in reducing plaque and gingival inflammation and can be considered a safe and effective alternative for chemical plaque control.

CONCLUSION:

Within the limitations of the present study, chewing gum containing EDTA, MSM, and xylitol demonstrated a significant reduction in plaque and gingival scores comparable to 0.12% chlorhexidine mouth rinse.

The chewing gum proved to be an effective, safe, and patient-friendly alternative for chemical plaque control without the common side effects associated with chlorhexidine. Hence, it may be recommended as an adjunct to routine oral hygiene practice.

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