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## RESEARCH ARTICLE

### A STUDY ON CARIES, PERIODONTAL STATUS AND SOME SALIVARY FACTORS IN LACTOVEGETARIANS

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#### ABSTRACT

Twenty-eight lacto vegetarians also age- and sex-matched controls were questioned about their dietary habits, especially the frequency of consumption of acid fruits, drinks and foods, as well as their dental health habits. Samples of stimulated saliva were collected in connection with the clinical and radiologic study. Plaque, Gingival and Calculus Indices weren't significantly different in lacto vegetarians and controls. Of the lacto vegetarians 76.9% and of the controls none had dental erosions on some tooth surfaces. In lacto vegetarians the rate of flow of stimulated saliva was lower than in controls but did not decrease with advancing age as it did in controls. Salivary pH was lower in lacto vegetarians than in controls.

## INTRODUCTION

Both the traditional belief and recent interest in "natural foods" boost the notion that fruits and vegetables make a positive contribution to oral health by arresting caries (Geddes, 1977; Imfeld, 1978; Kimj, 1983) and increasing the resistance of periodontal tissues (Thomsomne, 1981) Omission of meat is the principle of a vegetarian diet. However, there are many variations of it, the most radical of which is veganism, which permits only plant foods. Lacto vegetarianism allows plant foods with dairy products and lacto-ovo vegetarianism adds eggs to the diet. So far, there have been only few publications dealing with the influence of vegetarian diet on the condition of the oral cavity, and most reports have so far mainly appeared from within Western populations (Kimj, 1983). A vegetarian diet has been reported to have a damaging effect on the teeth (Alland, 1967; Aeschbacher Bull, 1967; Ecclejsd, 1974; Fullerjl, 1977; Touvez, 1981), especially causing erosions influenced by acid fruits, foods and drinks. The aim of this study was to compare the dental and periodontal health and some salivary factors of lactovegetarians and their sex- and age-matched controls.

## MATERIAL AND METHODS

The subjects of this study were 28 lactovegetarians and controls, age- and sex-matched on an individual basis. The age- and sex distribution of lactovegetarians as well as the duration of the diet is shown in Table 1. All lactovegetarians had maintained their diet for at least 2 yr. Prior to clinical examination the subjects were questioned about their general health status, dietary habits, duration of lactovegetarian diet, discrepancies in masticatory function (TMJ), and dental health habits. The clinical examination of periodontal status, restorations, dental caries and TMJ disorders was performed with radiologic diagnosis. Plaque Index (Silnesjs), Gingival Index <sup>(13)</sup>, Calculus Index, <sup>(14)</sup> filling overhangs, probing depths (in mm) to the bottom of the pocket, and tooth mobility were recorded. The tooth mobility was recorded on a scale of 0-3 as follows: no mobility, horizontal mobility up to 1 mm, horizontal mobility more than 1 mm and vertical mobility, respectively. Alveolar bone loss was measured in orthopantomographs by the method of SCHEI et al. Wax-stimulated mixed saliva (5 min flow) was collected at least 12 h after the last meal for the Dento cult test, which is a method for counting salivary lactobacilli and for determining pH and buffering capacity, and centrifuged at 3000 rpm. The supernatants were immediately frozen and stored at -20°C until used.

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The salivary lactobacilli in each sample were counted and classified as "low" (0-1000 per ml), "medium" (1001-100 000 per ml) or "high" (>100 000 per ml) (Schei, 1959). The data were analyzed statistically using Student's t-test.

## RESULTS

Some differences were found between the dietary habits of the lactovegetarians and those of the controls. The highest eating frequency of three meals per day was found in about one-third of the lactovegetarians, but only in 4% of the controls. Of the lactovegetarians 50% did not use sugar at all and 18% consumed it only once a day, but 60% of the controls used sugar one to three times a day. About half of the lactovegetarians used honey, 25% of them daily. None of the controls used honey regularly and only 24% occasionally.

Tooth brushing frequency was the same in both groups; about 88% of the subjects brushed their teeth at least once a day. Dental floss was used by 38% and toothpicks by 75% of the subjects in both groups. Frequency of dental visits was the same for both lactovegetarians and controls; however, periodontal measures had been taken in half of the controls but only in one-third of the lactovegetarians during dental visits. The amount of oral hygiene instruction received during dental visits was also less for the lactovegetarians than for the controls.

The general health of the subjects was good, and no special diseases were found that might affect the masticatory system. There were dental erosions on some tooth surfaces of 76.9% of the lactovegetarians but none of the controls. Discrepancies in masticatory function were diagnosed clinically in 21% of the lactovegetarians and in 44% of the controls. Self-reported TMJ-discrepancies and headache were rare among the lactovegetarians; 15% and 35% of the controls, respectively, suffered from these problems. The mean number of remaining teeth and also the number of decayed or filled surfaces of teeth (calculated as percentages of the surfaces at risk) were higher in the lactovegetarians than in the controls.

In the oldest group (>45 yr), however, the number of teeth was greater in the lactovegetarians, but the percentage of DF-surfaces was lower, than in the controls. In the oldest age group, Plaque, Gingival and Calculus Indices were higher in the lactovegetarians than in the controls (Table 2), although none of these index values differed statistically significantly between the groups (Table 2). Periodontal pockets (depth 4 mm or over) were found in 66.7% of the lactovegetarians and 73.1% of the controls. No differences in tooth mobility or alveolar bone loss were found between the groups.

The rate of flow of stimulated saliva was lower in the youngest (<35yr) lactovegetarians ( $P < 0.05$ ) than in the controls but did not decrease with advancing age as it did in the controls (Table 3).

The duration of the diet somewhat, but not statistically significantly, increased the rate of flow. Salivary pH was lower in the lactovegetarians than in the controls ( $P < 0.001$ , Table 3). The duration of the diet influenced neither the pH nor the buffering capacity of saliva in the lactovegetarians. In the age group 44 yr or less 20% of the lactovegetarians had a

"high" lactobacillus count. In the oldest group only 10% of the lactovegetarians had a "high" lactobacillus count instead of 42.9% in the controls (Table 4).

TABLE 1: Percentage distribution of lactovegetarian subjects according to age and sex, and duration of their diet (n = 28)

Duration of lactovegetarian diet	Age (yr)			All
	≤ 35	36-44	≥ 45	
<b>Men:</b>				
2-3 yr	33.3	—	25.0	33.3
4-10 yr	66.7	100.0	50.0	22.2
> 10 yr	—	—	25.0	44.4
<b>Total (n)</b>	<b>100.0 (3)</b>	<b>100.0 (2)</b>	<b>100.0 (4)</b>	<b>100.0 (9)</b>
<b>Women:</b>				
2-3 yr	28.6	25.0	—	36.8
4-10 yr	42.9	50.0	75.0	42.1
> 10 yr	28.6	25.0	25.0	21.1
<b>Total (n)</b>	<b>100.0 (7)</b>	<b>100.0 (8)</b>	<b>100.0 (4)</b>	<b>100.0 (19)</b>

Table 2

Dental health status of lactovegetarians and controls: mean number of teeth, percentages of decayed or filled surfaces at risk and Plaque, Gingival and Calculus Indices by age

	Age group (yr)*							
	≤ 35		36-44		≥ 45		All	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<b>Number of teeth</b>								
Lactovegetarians	29	3	24	6	25	5	26	5
Controls	25	10	27	4	20	10	24	9
<b>Decayed or filled surfaces</b>								
Lactovegetarians	22.9	8.3	27.6	9.8	30.7	11.8	28.3	12.7
Controls	17.9	10.8	25.5	15.9	39.7	25.4	24.8	17.6
<b>Plaque Index</b>								
Lactovegetarians	0.68	0.28	0.84	0.44	0.96	0.61	0.83	0.46
Controls	0.69	0.24	0.69	0.25	0.72	0.56	0.70	0.36
<b>Gingival Index</b>								
Lactovegetarians	0.80	0.28	0.95	0.25	1.51	1.05	1.09	0.69
Controls	0.80	0.24	1.19	0.42	1.06	0.71	1.01	0.49
<b>Calculus Index</b>								
Lactovegetarians	0.13	0.25	0.55	0.33	0.83	0.64	0.52	0.51
Controls	0.40	0.24	0.79	0.55	0.68	0.38	0.62	0.45

\* Differences between the groups were not statistically significant.

Table 3

Rate of flow of saliva, pH and buffering capacity by age in lactovegetarians and controls

	Age group (yr)											
	≤ 35			36-44			≥ 45			All		
	Mean	SD	P <	Mean	SD	P <	Mean	SD	P <	Mean	SD	P <
<b>Rate of flow (ml/min)</b>												
Lactovegetarians	1.2	0.5		1.2	0.7		1.3	0.7		1.2	0.6	
Controls	2.1	0.8	0.05	1.4	0.7	NS	1.0	0.4	NS	1.5	0.8	NS
<b>pH</b>												
Lactovegetarians	7.2	0.2		7.1	0.3		7.2	0.2		7.2	0.2	
Controls	7.7	0.2	0.001	7.5	0.2	0.01	7.3	0.3	NS	7.5	0.3	0.001
<b>Buffering capacity</b>												
Lactovegetarians	0.04	0.06		0.01	0.01		0.02	0.01		0.02	0.04	
Controls	0.02	0.01	NS	0.02	0.02	NS	0.01	0.01	NS	0.01	0.01	NS

Table 4

Percentage distribution of subjects in different age groups according to number of lactobacillus (count/ml)

	Age (yr)	
	≤ 35	≥ 45
<b>Lactovegetarians:</b>		
Low (0-1000)	59.0	40.0
Medium (1001-100 000)	39.4	50.0
High (> 100 000)	28.6	10.0
<b>Total (n)</b>	<b>100.0 (10)</b>	<b>100.0 (10)</b>
<b>Controls:</b>		
Low (0-1000)	55.6	42.9
Medium (1001-100 000)	41.1	24.3
High (> 100 000)	11.1	19.0
<b>Total (n)</b>	<b>100.0 (18)</b>	<b>100.0 (7)</b>

## DISCUSSION

The aim of this study was to make clear the dental, periodontal and saliva conditions of the lacto vegetarians. Because it was a pilot study, the number of subjects was small, but still some interesting observations were made. No statistically significant differences were found in either the number of remaining teeth and caries or in periodontal status. Because the history of caries and fillings generally belongs to the young years and the subjects of this study were all adults, no special conclusions can be drawn. In the oldest lactovegetarians, however, a trend to a higher number of remaining teeth with smaller percentages of DF-surfaces was found. Despite poorer oral hygiene the periodontal resistance seemed to be better in this group. Fruits and vegetables have been regarded to be key foods affecting the salivary flow and pH; fruits because they stimulate a large flow of alkaline saliva, and vegetables because chewing stimulates the salivary flow and also exerts a cleaning action on the tooth surfaces (Larmams, 1974). Recent experimental studies indicate that chewing fibrous foods has a limited effect on those surface areas most susceptible to caries and periodontal disease (Bergenholt, 1967; Lindhej, 1969). The findings in the present study are in general agreement with this. According to CALDWEL (Caldwelrlc, 1970), both chewing and the acidity of fruits cause additional salivary flow. Among the younger persons in our study, however, both the flow rate and the pH of wax-stimulated whole saliva were lower in the lactovegetarians than in the controls. Perhaps for people who normally chew large amounts of rough, fresh food chewing of tasteless wax is not stimulating. In the older subjects, however, a high capacity for salivary secretion was still clearly evident. The salivary pH was significantly lower ( $P < 0.001$ ) in the lactovegetarians than in the controls, and in the lactovegetarians the pH of saliva did not decrease with advancing age (Table 3). This phenomenon may be declared by same findings in the rate of flow of saliva. No clear differences in dental and periodontal health were found between the lactovegetarians and the controls. Some interesting differences were observed, especially in salivary factors, which are worth further study.

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