

Original Research

Evaluation of Effect of Probiotics on Saliva of Edentulous Patients

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ABSTRACT:

Background: A probiotic that could alter the oral microbial ecology may be a useful tool in the clinical management of periodontitis, with the potential to offer two-fold benefits. Firstly, to combat dysbiosis by competitive inhibition of periodontal pathogens, and thereby reducing the overall immunogenicity of the oral microbiota. Secondly, to modulate active disease-associated immune/inflammatory pathways to reduce the destructive inflammation of periodontitis, and lead to immune homeostasis that could be maintained by the host in the long term. **Aim of the study:** To evaluate the effect of probiotics on saliva in edentulous patients. **Materials and methods:** The subjects for the study were selected among the completely edentulous patients who reported to the department in the need of complete denture. Only those patients were included whose age was 60 years and more and were not suffering from any chronic debilitating condition. **Results:** In the present study, a total of 50 patients were selected for the study. We observed that highest frequency of patients belonged to age group 65-70 years (n=22), followed by age group 70-75 years (n=14). Least number of patients were seen in age group 80-85 years. We observed that unstimulated saliva production on day zero and on 60th day was 0.749 gm and 1.36 gm respectively. Similarly, the stimulated production of saliva on day zero was 1.889 gm and on 60th day was 2.29 gm. **Conclusion:** The production of saliva overall was seen to increase with taking probiotics. The increase in production of saliva was seen in stimulated as well as unstimulated saliva production.

Key words: Probiotics, saliva, edentulous

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INTRODUCTION:

Probiotics, by definition are viable microorganisms which, when administered in adequate amounts, provide a health benefit to the host. This approach has successfully been used to control intestinal diseases and appears to act through colonisation resistance and/or modulation of the immune system.^{1,2} Likewise, studies are now suggesting that probiotics have the potential to modify the oral microbiota and are being investigated to prevent or treat diseases of the oral cavity, such as dental caries and the periodontal diseases, which are associated with a shift in the microbial composition and activity of the biofilm, and the resulting reaction of the host.³ Strains belonging to the *Lactobacillus*, *Streptococcus* and *Bifidobacterium* genera are most commonly investigated as regards probiotics. A probiotic that could alter the oral microbial ecology may be a useful tool in the clinical management of periodontitis,

with the potential to offer two-fold benefits.⁴ Firstly, to combat dysbiosis by competitive inhibition of periodontal pathogens, and thereby reducing the overall immunogenicity of the oral microbiota. Secondly, to modulate active disease-associated immune/inflammatory pathways to reduce the destructive inflammation of periodontitis, and lead to immune homeostasis that could be maintained by the host in the long term.⁵ Ecological surveys reported in studies that investigated probiotics for preventative oral care have provided some insights into the changes occurring in the oral microbiome of healthy individuals consuming probiotic products. A course of *Lactobacillus rhamnosus* GG and *Bifidobacterium animalis* ssp. *lactis* containing lozenges taken by healthy individuals were reported to show no significant changes in the salivary ecology compared to baseline as profiled by the human oral microbe identification microarray, but did

allow an improvement in gingival health.⁶ Hence, the present study was planned to evaluate the effect of probiotics on saliva in edentulous patients.

MATERIALS AND METHODS:

The study was conducted in the Department of Prosthodontics, Institute of Dental Sciences, Sehora, Jammu, Jammu and Kashmir, India. The ethical clearance for study protocol was obtained from ethical committee of the institution. The ethical clearance for study protocol was obtained from ethical committee of the institution. The subjects for the study were selected among the completely edentulous patients who reported to the department in the need of complete denture. Only those patients were included whose age was 60 years and more and were not suffering from any chronic deliberating condition. A written informed consent was taken from the patients after explaining them the study protocol. The probiotic strains used in the study were Lactobacillus rhamnosus GG-HS111, Lactobacillus Acidophilus-HS101, and Bifidobacterium bifidum. These strains were combined in powder form in equal amount in a power of 108 CFU (3.3×10^7 CFU of each) per capsule and given to patient to be taken once daily. The collection of saliva for patients was done using two methods, collection for unstimulated saliva production and collection for stimulated saliva production. For unstimulated saliva measurement, patients were asked to sit quietly without talking or chewing and were asked to spit any saliva that had been collected at the bottom of the mouth in a

measuring beaker. For stimulated saliva measurement, patients were given chewing gum and were asked to spit the saliva for 5 minutes into the beaker. After collection of saliva, the beaker was weighed on a weighing scale. The collection of saliva was done on the first day and then, they were given probiotics capsules to be taken once daily for 60 days. After 60 days, patients were recalled for follow up and saliva production was measured.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student’s t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS:

In the present study, a total of 50 patients were selected for the study. Table 1 shows the number of patients in each age group. We observed that highest frequency of patients belonged to age group 65-70 years (n=22), followed by age group 70-75 years (n=14). Least number of patients were seen in age group 80-85 years. Table 2 and fig 2 shows the change in saliva production with 60 days of taking probiotics. We observed that unstimulated saliva production on day zero and on 60th day was 0.749 gm and 1.36 gm respectively. Similarly, the stimulated production of saliva on day zero was 1.889 gm and on 60th day was 2.29 gm. The results on comparison were seen to be statistically significant.

Table 1: Number of patients in each age group

Age groups (years)	Number of patients
65-70	22
70-75	14
75-80	5
80-85	4
85-90	5

Figure 1: Number of patients in each age group

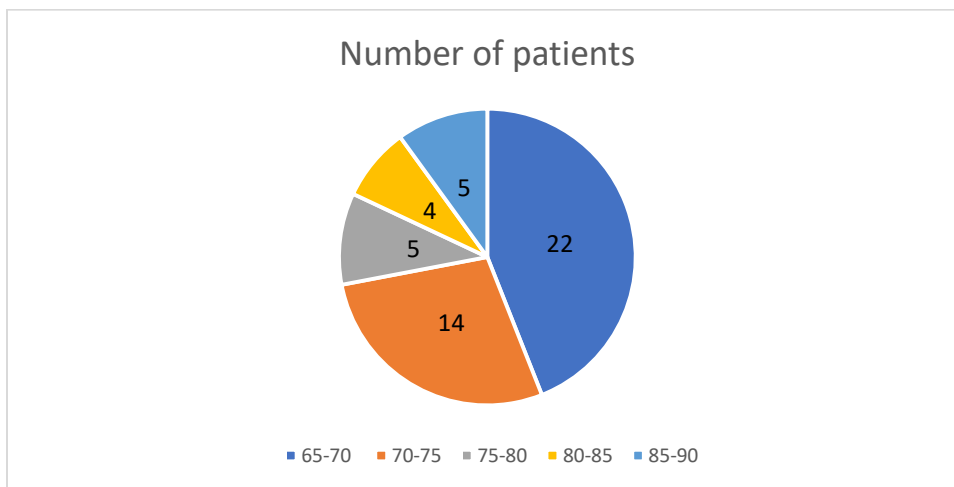
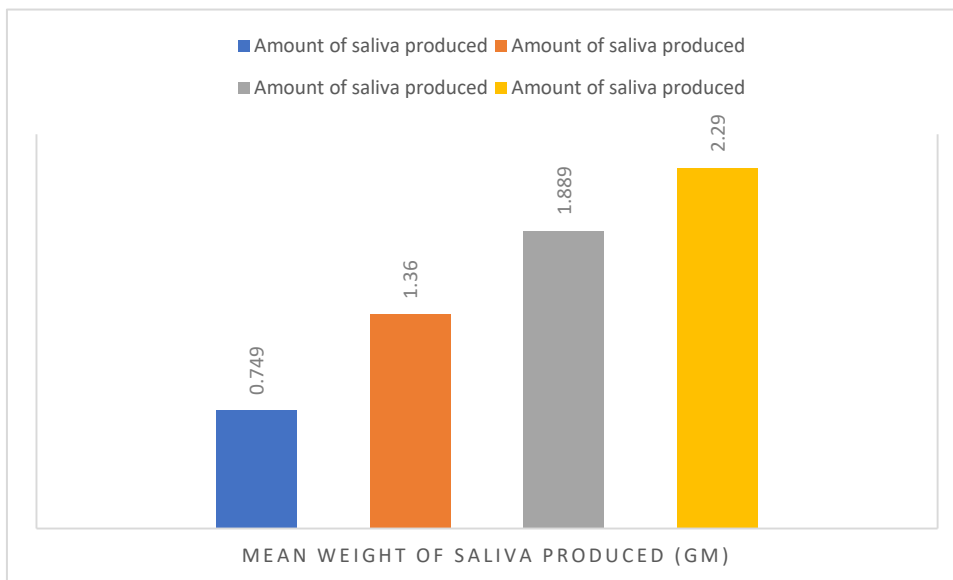


Table 2: Comparison of change in saliva production

	Amount of saliva produced			
	Unstimulated		Stimulated	
	On day zero	On 60 th day	On day zero	On 60 th day
Mean weight of saliva produced (gm)	0.749	1.36	1.889	2.29

Figure 2: Change in saliva production with 60 days of taking probiotics



DISCUSSION:

In the present study, we observed significant increase in the production of stimulated and unstimulated saliva in the subjects after taking probiotics for 60 days. The results were observed to be statistically significant. Sanghvi U evaluated the amount and pH of saliva after using probiotics for 60 days in completely edentulous patients. The interventional prospective study was conducted at the department of prosthodontics of the institute. The study was conducted on edentulous patients. The whole unstimulated and stimulated saliva was collected at baseline and amount, and pH was measured. Then, each patient was given probiotic capsules reaching 3.3×10^7 CFU/g to consume daily once for 60 days. Saliva was recollected from patients, and its amount and pH was calculated and compared with baseline. On comparison of saliva before and after consuming probiotics, there was an increase in the mean unstimulated and stimulated saliva from baseline to that after 60 days, the difference being 0.406 and 0.433, respectively. The difference was statistically significant with $P < 0.001$. The mean pH at baseline was 7.818 ± 0.231 which increased after 60 days to 7.825 ± 0.189 , the difference being 0.007. This study concluded that probiotics increase the amount of saliva of completely edentulous patients and so it can be helpful in patients suffering from xerostomia/hyposalivation. Sutula J et al conducted a three-phase study (7 weeks) designed to

investigate simultaneously the effect of 4-week consumption of the probiotic-containing milk drink Yakult on the microbiota of saliva and dorsum tongue coating in healthy dentate people ($n = 22$) and levels of volatile sulphur compounds (VSCs) in morning breath. Study phases comprised one baseline visit, at which 'control' levels of oral parameters were obtained prior to the probiotic product consumption; a 4-week period of daily consumption of one 65 ml bottle of Yakult, each bottle containing a minimum of 6.5×10^9 viable cells of Lactobacillus casei strain Shirota (LcS); and a 2-week washout period. The microbial viability and composition of saliva and tongue dorsum coating were assessed using a range of solid media. The presence of LcS in the oral cavity was investigated using a novel selective medium, 'LcS Select'. Portable sulphur monitors Halimeter® and OralChroma(TM) were used to measure levels of VSCs in morning breath. Utilization of the LcS Select medium revealed a significant but temporary and consumption-dependent presence of LcS in saliva and tongue plaque samples from healthy dentate individuals ($n = 19$) during the probiotic intervention phase. LcS was undetectable with culture after 2 weeks of ceasing its consumption. Morning breath scores measured with Halimeter and OralChroma were not significantly affected throughout the trial, except in a small number of individual cases where Halimeter scores were significantly reduced during the probiotic

intervention period. Natural fluctuations in resident acidogenic populations, and numbers of *Candida* and anaerobic species, including malodourous Gram-negative anaerobes, were unaffected. They concluded that while no broad ecological changes in the mouth were induced by consumption of Yakult in healthy dentate individuals, findings of this study confirm the temporary and intake-dependent presence of LcS. Future studies could focus on subjects at greater risk of oral infection, where ill-defined microbiota (e.g. an increased presence of periopathogens) or clinically diagnosed halitosis might be significantly affected by consumption of this probiotic.^{7,8}

Ishikawa KH et al evaluated the short-term effect of probiotics in reducing the infection level of oral *Candida* in candidiasis-asymptomatic elderly denture wearers. In a double-blind randomized study, 59 denture wearers harboring *Candida* spp. in the oral cavity with no clinical symptoms were allocated into two groups: probiotic and placebo. All patients were instructed to clean the denture daily. The probiotic group poured a capsule containing lyophilized *Lactobacillus rhamnosus* HS111, *Lactobacillus acidophilus* HS101, and *Bifidobacterium bifidum* daily on the palatal surface of the maxillary denture, whereas the placebo group was submitted to the same regimen using placebo capsules. *Candida* spp. infection levels were evaluated in palate mucosa samples obtained before and after a 5-week experimental period. All patients harbored *Candida* in the palate mucosa at baseline. Fifty-five individuals completed the experimental period. The detection rate of *Candida* spp. was 92.0% in the placebo group after the experimental period, whereas it was reduced to 16.7% in the probiotic group. The reduction promoted by the probiotic regimen was independent of baseline characteristics such as *Candida* infection level and colonizing species, age of denture, and other variables. They concluded that the probiotic product was effective in reducing the colonization of the oral cavity with *Candida* in candidiasis-asymptomatic elderly denture wearers, suggesting that this multispecies probiotic could be used to prevent oral candidiasis. Miyazima TY et al evaluated the effect of consumption of two experimental probiotic-containing cheeses on the oral colonization of *Candida* in denture wearers. Sixty denture wearers harboring oral *Candida* were randomly allocated in groups who received cheese supplemented with *Lactobacillus acidophilus* NCFM (T1) or *Lactobacillus rhamnosus* Lr-32 (T2), daily for 8 weeks, and a control group (C) who received a control cheese. Oral samples were obtained through a mouthwash, and *Candida* levels were determined (CFU/mL) at baseline and after the 8-week experimental period. At baseline, the mean levels of *Candida* spp. (log CFU/mL) were similar

among the groups. However, the mean levels of *Candida* were significantly reduced in groups T1 and T2 but not in C. The reduction in *Candida* oral levels occurred independently on the colonizing *Candida* species, participant age, and use of bi- or unimaxillary dentures. They concluded that daily consumption of cheese supplemented with probiotics, with either *L. acidophilus* NCFM or *L. rhamnosus* Lr-32, was able to reduce the colonization of oral *Candida* in complete denture wearers, suggesting its potential in reducing the risk of oral candidiasis in this highly susceptible population.^{9,10}

CONCLUSION:

From the results of the present study, this can be concluded that the production of saliva overall was seen to increase with taking probiotics. The increase in production of saliva was seen in stimulated as well as unstimulated saliva production.

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