Antimicrobial Activity of Denture Adhesives Against *Lactobacillus*, *Streptococcus mutans*, *Candida albicans*

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ABSTRACT

Denture Stomatitis is a common issue in denture wearers. It is mainly due to its continued use. Once when the patient finds it uncomfortable discontinue the usage. Prevention of mucositis or stomatitis is very important in the denture wearers. It can be prevented by maintaining proper oral hygiene. But in immunocompromised state it is very difficult to maintain especially in old age patients. Denture adhesives are normally used by the denture wearers to have the denture firmly fixed in the mouth. This can be used to prevent the formation of denture stomatitis in the patients. Two types of materials are used by the patients, gel form and powder form adhesives. This study is done to find out the antimicrobial activity of the denture adhesives against the common organisms associated with Denture stomatitis. The antimicrobial effect of the denture adhesive is tested with 3 organisms, *C.albicans*, *S. mutans* and *Lactobacillus*. The anti microbial activity was tested by agar well diffusion method. The media used are, SDA agar and TSA. Wells were cut with a sterile steel tube. TSA was used for *Lactobacilli* and *S. mutans* and SDA was used for *C.albicans*. On each plate 3 wells were cut and the adhesives were filled in it. The adhesives were mixed in sterile Petri dishes and allowed to expand. Thus it was transferred to the well after coating the agar surface with the organism. Then the plates were incubated at 37 degree C for 12 hrs and examined for the zone of inhibition around the well. The zone was measured with a scale and tabulated. The results were obtained as for powder the zone of inhibition in *Lactobacillus* was 11 mm , zone of inhibition for powder in *C.albicans* was 14 mm and the zone of inhibition for powder in *S.mutans* was 10.5 mm which showed a better anti microbial activity for denture adhesive in powder form whereas for gel form the zone of inhibition was not seen. In this study with the 2 products tests, powder has more antimicrobial activity than gel and found to be active against *Lactobacillus* , *Candida albicans* and for *Streptococcus mutans*.

KEY WORDS: DENTURE STOMATITIS, DENTURE ADHESIVE, LACTOBACILLUS , CANDIDA ALBICANS, STREPTOCOCCUS MUTANS.

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INTRODUCTION

In the fast moving world, most people are worried about aesthetics. In dentition, the doctors provide at most care to the patients to give better treatment and to achieve their satisfaction. This level of aesthetics especially in dentistry provides the patients the confidence to face the world (Manipal et al., 2014). Thus the denture usage by the patients has increased much. As an irony we know that every has an adverse effect, denture wearers also face a common problem known as denture stomatitis (Reichart, 2000). Denture Stomatitis is a common issue in denture wearers. It is mainly due to the continued use of the dentures. The Denture stomatitis is a chronic disease that is given by a localised or generalised inflammation of the oral mucosa beneath the dentures (Gendreau and Loewy, 2011).

Although this disease has a high frequency level in recent times, the patients who feel the burning, itching, and pain sensation are comparatively less and the disorder is only primarily diagnosed by the presence of the inflammation condition in the mucosal tissue (BUDTZ-JÖRGENSEN, 1974). This disorder is mainly caused by the microorganisms commonly found in the oral cavity which includes *Lactobacillus*, *Streptococcus mutans*, *Candida albicans*. The denture adhesives are the ideal cream or paste that are used over the dentures to provide grip for the dentures to hold through. These denture adhesives provide a neutral or slightly basic pH, cytotoxicity and bonding strength to the oral mucosa (Zhao et al., 2004; Ashwin and Muralidharan, 2015).

The denture adhesives is thus most commonly prescribed by the dentist as it renders additional retention, comfort and mastication facility for the dentures and inhibits the accumulation of food debris in the space between the dentures (Kumar et al., 2015). However this denture adhesives should not be used in a patient where the denture is completely ill-fitting and under such conditions more denture adhesives will be suggested to provide retention, which is not advised. Thus the usage of denture adhesives is provided to patients with correct doses and proportion for optimum results. These denture adhesives are available in powder, cream, or liquid form. It was first discovered in 1913 and developed in the 1920s and 30s (Shamsolketabi and Nili, 2018). Denture adhesives also provide a confidence for the patients to face the external world especially during the public occasions (Slaughter, Katz and Grasso, 1999; Shahana and Muralidharan, 2016).

Hence the denture adhesive activity on antibacterial property after placing in the oral cavity against the oral pathogens and preventing its harmful effect are measured to know its activity against bacterial species according to the previous research (Imazato et al., 2003), (Selvakumar and Np, 2017). And moreover if the denture adhesives provide biocompatibility and have Anti-Candida action, even used for a short period of time render a great effect in treating denture stomatitis and providing a better

treatment measure (Bates et al., 2017). Thus the denture adhesives are materials that produce enormous results in dentistry and now in this study, its effect on the oral pathogens are tested and its antimicrobial activity is measured.

Figure 1: Denture adhesives used.

MATERIAL AND METHODS

In this study, the denture adhesive which is of powder and paste form was taken. The denture adhesives used in this study were Fixon (powder), Denofit (gel) (Figure 1). The powder was taken in sterile petri dishes, and 5 ml of distilled water was added. It is then mixed nicely with a sterile stick and held for 5 hours. The mix is kept separately so that it is not contaminated. In the same way the paste form of denture adhesive is also placed in a separate sterile petri plate and kept separately to prevent it from contamination. These plates were isolated because of swelling action of the denture adhesives. Well diffusion method: The anti microbial activity was tested by agar well diffusion method. The media used are SDA agar and TSA. Wells were cut with a sterile steel tube. TSA was used for *Lactobacilli* and *S. mutans* and SDA was used for *C.albicans*. On each plate 3 wells were cut and the adhesives were filled in it. The adhesives were mixed in sterile Petri plates and allowed to expand. Thus it was transferred to the well after coating the agar surface with the organism (figure 2). Then the plates were incubated at 37 degree C for 12 hrs and examined for the zone of inhibition around the well. The zone was measured with a scale and tabulated.

Figure 2: Denture adhesive transferred to petri plates.

Figure 3: Antimicrobial activity of denture adhesive powder against *Lactobacillus*. Figure 4: Antimicrobial activity of denture adhesive powder against *C. albicans*. Figure 5: Antimicrobial activity of denture adhesive powder against *S.mutans*.

RESULTS AND DISCUSSION

The obtained results for the antimicrobial activity are shown in the table 1, bar graph 1 and in figure 3, 4 and 5. Thus the tabulated results (table 1) for the denture adhesive obtained as for powder the zone of inhibition in *Lactobacillus* was 11 mm, zone of inhibition of powder in *Candida albicans* was 14 mm and the zone of inhibition for *Streptococcus mutans* was 10.5 mm which showed a better antimicrobial activity whereas for gels the zone of inhibition was not seen (bar graph 1). Thus in study we observe that the denture adhesive of powder form shows a better antimicrobial property than the paste form.

Table 1. Represents the microorganisms and the corresponding mean value of antimicrobial activity in mm of denture adhesives.

	POWDER(mm)	GEL(mm)
<i>S.Mutans</i>	10.5	0
<i>Lactobacilli</i>	11	0
<i>C.Albicans</i>	14	0

Bar graph 1: This bar graph represents the correlation between the micro organisms and their respective zone of inhibition for powder and gel forms of denture adhesives. Blue colour denotes the effect of powder form and red colour denotes the effect of gel form. X-axis represents the microorganisms tested and Y-axis represents the zone of inhibition measured in mm. As there is no antimicrobial activity seen with gel, red bar is not represented

The human oral cavity contains various natural surroundings, including the teeth, gingival sulcus, tongue, hard and delicate palates, and tonsils, and acts the tract which associate the outside and the stomach related tract and respiratory tract of human body, which gives the fitting space to the colonization of microorganisms (Dodwad, 2011). The microorganisms found in the human oral pit have been alluded to as the oral microflora, oral microbiota, or oral microbiome (Dewhirst et al., 2010). Oral diseases may mess wellbeing up in immunocompromised hosts. Agent microorganisms in astute contaminations of

the oral cavity are *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Candida albicans* (Ding and Schloss, 2014). The denture adhesives are the retentive materials which are commonly used for providing retention in denture wearers (Shay, 1991, Nam et al., 2016). The antimicrobial property of these denture adhesives were analysed in both powder and gel forms. The denture adhesives involved in this study were Fixon (powder), Denofit (gel) (Figure 1). Thus the antimicrobial property comparison between the gel and the powder forms provided that the powder form had a higher antimicrobial property against the oral microorganisms than the gel form of denture adhesives.

CONCLUSION

In this study with the two products tested, powder has more antimicrobial activity than gel and found to be active against *Lactobacillus*, *Candida albicans* and for *Streptococcus mutans*. Powders can be recommended for patients who develop stomatitis.

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