

ANTIMICROBIAL EFFICACY OF COMMERCIALY AVAILABLE DENTURE CLEANSING AGENTS AND CHLORHEXIDINE AGAINST CANDIDA AND S. MUTANTS ON BPS MATERIAL

Gayatri K Rajpurohit

*Department of Prosthodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University Chennai, India
Email id: 151601045.sdc@saveetha.com*

Dr. Muralidharan N.P*

*Assistant Professor, Department of Prosthodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University Chennai, India
Email id: muralidharan@saveetha.com*

Dr. Dhanraj Ganapathy

*Professor, Department of Prosthodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University Chennai, India
Email id: sanjanadevin.sdc@saveetha.com*

Dr. Sanjana Devi N

*Assistant Professor, Department of Prosthodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University Chennai, India
Email id: sanjanadevin.sdc@saveetha.com*

ABSTRACT:

Denture wearers are often affected by Denture Stomatitis which is caused by c.albicans but there are evidence that it is not just because of solely candida but rather it is a biofilm formed by multispecies including streptococcus mutans which is also a frequent member of acrylic denture along with Candida. So this study was done to see the sensitivity of candida and s.mutans against chlorhexidine and a commercially available denture cleansing agent. The main purpose of the study was to evaluate the antimicrobial action of chlorhexidine and denture cleansing substance (sodium perborate monohydrate) on BPS and conventional dentures. Secure tablets, chlorhexidine mouthwash, 20 autoclaved slabs of BPS, 20 autoclaved slabs of conventional denture were the materials required. The autoclaved slabs were incubated for the growth of Candida and S.mutans 10 on each slab. These slabs were then exposed to chlorhexidine and denture cleansing tablets further to this there reduction on microbial colony was calculated by incubating the slabs on SDA for candida and nutrient agar for s. mutans. The result showed reduction of the microbial colonies over BPS slabs when compared to conventional denture slabs. The BPS material has a smooth surface texture with zero porosity which resists microbial growth. Their surface does not allow microbial attachment.

Keywords: chlorhexidine, sodium perborate monohydrate, candida, s.mutans .

INTRODUCTION:

Complete dentures are important for rehabilitation of an individual suffering from a complete edentulous oral cavity. They improve a person's aesthetic appearance, their smile and confidence but apart from this complete denture also improves the masticatory efficiency and phonetics(1). Edentulism or toothlessness is a condition of complete tooth loss which is considered as diseases burden for oral cavity (2)

Dentistry has progressed along with time and so has the conventional denture system which is being replaced by the new Biofunctional Prosthetic System(BPS). These dentures are considered to have zero porosity, less shrinkage and more retention(3) ,since these dentures are said to have zero porosity (4) it acts as a better resistance to the microbes when compared to the conventional denture.

Denture wearers are often affected by Denture Stomatitis which is caused by *C. albicans* but there are evidence that it is not just because of solely candida but rather it is a biofilm formed by multispecies including streptococcus mutans which is also a frequent member of acrylic denture along with Candida (5). Previously our team has a rich experience in working on various research projects across multiple disciplines. (6), (7), (8), (9), (10), (11), (12), (13), (14), (15), (16), (17), (18), (19), (20) Now the growing trend in this area motivated us to pursue this project. So this study was done to see the sensitivity of candida and *S. mutans* against chlorhexidine and a commercially available denture cleansing agent. This study was carried out to check the efficiency of chlorhexidine and commercially available denture cleansing substances against bps and conventional denture material. Our team has extensive knowledge and research experience that has translated into high quality publications(21–40).

MATERIAL AND METHODS

In this study 60 autoclaved slabs, 30 each of BPS material and conventional dentures were prepared at the CAD-CAM lab with the help of dental technicians respectively. The slabs were finished and polished thoroughly. 30 slabs each were soaked in 100ml artificial saliva with 1% glucose and 50 microliters of 0.5Mcfarland standard of *Candida albicans* and *S. mutans* suspensions respectively . These slabs were incubated overnight at 37degree C. 20 slabs, 10 each BPS and conventional denture slab were removed and placed separately, each one in a sterile container having sterile saline and agitation for about 1 minutes. From the agitated saline 50 microliters was transferred to SDA for candidal growth and nutrient agar for *S. mutans* growth. 10 slabs of BPS, 5 each coated with candida were exposed for about 1 minute to 0.2% chlorhexidine and denture cleansing agents containing (sodium perborate), the same was followed for 10 slabs of BPA coated with *S. mutans*. Similarly 10 slabs of conventional denture slabs, 5 each were exposed for about 1 minute to 0.2% chlorhexidine and denture cleansing. While another 10 slabs of conventional denture material coated with *S. mutans* were also exposed in the same manner to 0.2% chlorhexidine and denture cleansing tablets. Post exposure each slab was separately agitated in a sterilized container with saline for about 1 minute. From the agitated saline 50 microliters was transferred on the cultural plate. SDA was used for candida and nutrient agar for *S. mutans*. All the 60 plates were incubated for 37*c overnight. The colony was evaluated and counted under visible light manually. The results were analyzed and tabulated.

RESULTS AND DISCUSSION

According to the graph of chlorhexidine 0.2 % mouthwash exposure on BPS material shows that the *S. mutans* colony was negligible in observation . The same results were absorbed with a denture cleansing tablet containing sodium perborate monohydrate. Figure 1 compares the results of control

groups of BPS coated with s. mutants and candida against chlorhexidine and sodium perborate tablets which showed a marked reduction in s.mutan. The growth of candida species can be observed but it was negligible. Figure 2 compares results of control groups of conventional denture slabs coated with s.mutans and candida against chlorhexidine and sodium perborate monohydrate. The results were not the same for conventional denture slabs. Growth of candida and s.mutans was observed more in comparison to BPS slabs. Thus proving BPS being more efficient in resistance to microbial growth. This could be because of the surface texture of BPS. The conventional dentures have a porous surface while the BPS system of dentures are with zero porosity (41).

MEAN VALUE/ BPS SLABS	Control group	With chlorhexidine	With secure tablets
<i>s.mutans</i>	75.2	0.2	0.0
<i>candida</i>	84.8	0.4	0.0

The table shows a mean value comparison of the control group of BPS denture slabs with the exposed group. It was observed that there was a negligible candida growth.

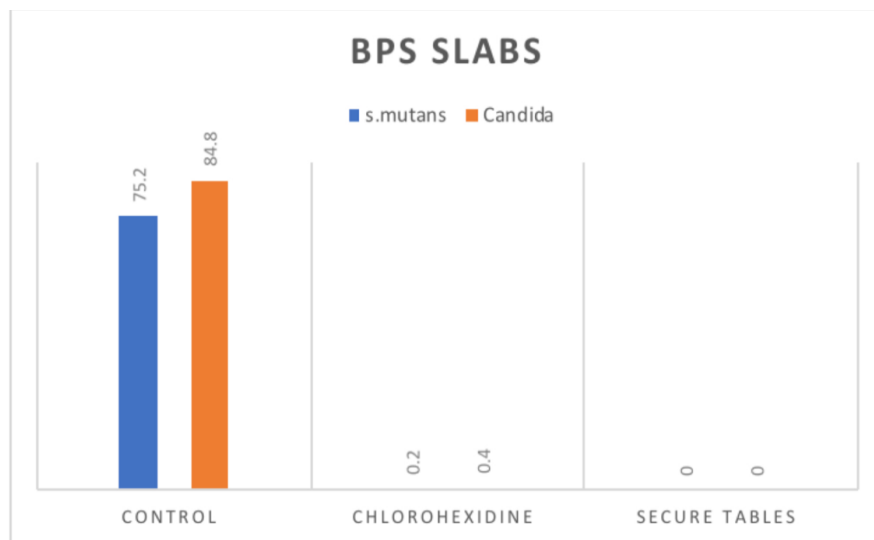


Figure 1. The graph shows the mean value comparison of the control group of BPS denture slabs with the exposed group. It was observed that there was a negligible candida growth.

MEAN VALUE/ CONVENTIONAL DENTURE SLABS	Control group	With chlorhexidine	With secure tablets
<i>s.mutans</i>	86.4	2.2	2.0
<i>candida</i>	92.8	2.6	2.4

The table shows a mean value comparison of the control group of conventional denture material slab with the exposed group. It was observed that there was a reduction in both the species but it was not that efficient like the BPS denture slabs.

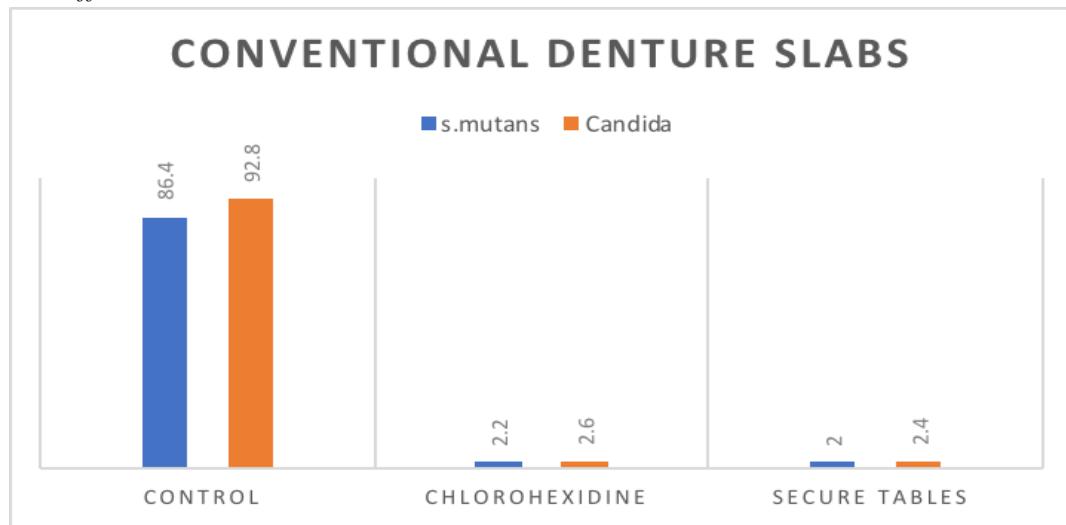


Figure 2. The graph shows a mean value comparison of the control group of conventional denture material slab with the exposed group. It was observed that there was a reduction in both the species but it was not that efficient like the BPS denture slabs.

It is a proven fact that BPS makes one of the best dentures when compared to the conventional denture not just in esthetic and functional requirements but also it is said to decrease the adhesion of *Streptococcus sanguis*, *Actinomyces viscosus* and *Saccharomyces albicans* (42,43), thus BPS is more preferable over conventional denture to resist the microbial load over the denture. Studies have already proved that *Candida* is the cause for denture stomatitis (44,45). Since *Candida* is the normal commercial of the oral environment and it cannot be removed completely but its pathogenicity can be reduced using different cleansing agents. Only mechanical cleansing does not reduce the lesion but chemical agents are also needed (46,47). To help maintain the hygiene of a denture mechanical brushing with the cleansing agent was considered effective maybe due to the extra effect of mechanical and chemical source (48,49). But there are other studies which report increases in the surface roughness post use of denture cleansing agents (50,51). Our institution is passionate about high quality evidence based research and has excelled in various fields (52–62). We hope this study adds to this rich legacy. Thus this study was carried out to check if the BPS system was more efficient than conventional denture in reduction of microbial load post chemical cleansing without mechanical cleaning to avoid surface abrasion.

CONCLUSION:

From the present study it can be concluded that the amount of microbial colony formed in BPS was less when compared to the conventional denture materials. Thus BPS would be more efficient to resist the growth of microbes on its surface. Its zero porosity acts as a lock for no microbes to get attached to the surface of the BPS denture. Patients with BPS have a less chance of being affected by denture stomatitis due to the reduced attachment.

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CONFLICT OF INTEREST: NIL

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