

# Denture Hygiene in Geriatric Persons

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## Abstract

Denture therapy for geriatric patient is expected to be in high demand owing to expanding proportion of elderly population. Oral hygiene has been found to be poor among the elderly. Patients are either unable or unmotivated to clean their dentures adequately. A simple effective denture cleaning methods that removes and / or kills micro-organisms on acrylic resin denture are desirable. Various methods of denture cleansing and special concerns for geriatric denture wearers are presented.

## INTRODUCTION

The life expectancy has increased significantly over the past century. The geriatric population is the most rapidly growing segment of the general population. The average life expectancy in India is expected to reach 69.8 years for males and 72.3 years for females by 2021-2025 and elderly population to comprise 12.5% of total numbers.<sup>1</sup> Despite the simultaneous rapid improvement in oral health, tooth loss is still a problem in geriatric population. This has resulted in increased proportion of population using removable complete dentures. On mastication food, debris accumulates on and beneath various surfaces of the prosthesis and its elimination is difficult despite the proper prosthetic design. With advancing age the oral mucosa becomes more permeable to noxious agents and more prone to mechanical damage. Most mucosal changes in elderly are related to the use of dentures.<sup>2</sup> Poor fitting dentures, coupled with poor oral hygiene, constitute a major predisposing factor for oral fungal infection.<sup>3</sup> Diseases common among denture wearers include mouth ulcers, frictional keratosis and denture-induced stomatitis. The risk of oral complications is increased in presence of various diseases and conditions like diabetes mellitus, renal failure, cancer therapy, immunosuppressive drugs. The geriatric persons wearing complete dentures are more likely to be affected by such conditions and thus require more attention to their oral hygiene.

Care of the mouth and the prosthesis is foremost in the preventive aspects. The removal and cleaning of denture after every meal is essential for oral health. The purpose of this article is to review various methods and the materials

used for cleaning dentures for geriatric denture wearers.

## REVIEW

The tissue surface of acrylic resin dentures usually shows micro-pits and micro-porosities which harbor micro-organisms that are difficult to remove<sup>4</sup>, though these micro-pits of dentures are quite superficial.<sup>5</sup> The polishing of denture's tissue surface improves denture hygiene without affecting retention of the prosthesis. Dentures tend to collect plaque and stains if not cleaned regularly. Light and electron microscopic studies of denture sections have shown that the microbial plaque on the intaglio surface of denture has the same basic structure as plaque on the natural teeth.<sup>5,6</sup> Similar to dental plaque, denture plaque is difficult to remove.<sup>7</sup> Not only the dentures should be clean, but it should be relatively free of micro-organisms as the microbial plaque on the tissue surface of the dentures is a significant co-factor in the pathogenesis of denture stomatitis<sup>4,8</sup>, a commonly occurring condition in geriatric denture wearers. The conservative treatment for this includes antifungal agent, refining the occlusion and providing a sanitary denture<sup>6,9,10</sup>. It is of not much use to eliminate the associated micro-organisms from the mouth, if the oral tissues are inoculated repeatedly by a contaminated denture<sup>11</sup>. A routine denture cleansing regimen should be designed to remove and prevent accumulation of microbial plaque and also to remove mucin, food debris, calculus and exogenous discolorations<sup>12</sup>. The mechanical and chemical methods are the most frequently used for denture sanitation though other less favored methods are also mentioned in the literature like irradiation and sonic vibrations.

### MECHANICAL METHOD

Mechanical cleaning is an effective means of improving denture cleanliness and ensuring maintenance of healthy mucosa beneath removable denture<sup>7</sup>. It has been reported that using brush with soap or tooth paste is effective when used meticulously in removing artificial discoloration and plaque from acrylic resin dentures and is the most common method of routine denture cleansing<sup>9,10,12-14</sup>. There is no experimental evidence that brushing with a tooth paste or polishing paste is more efficient than using soap. Tooth brushing should be the first line of oral cleaning method unless not feasible due to impaired dexterity in a geriatric person as it has the advantage of rapid cleaning. However, this advantage may be overshadowed by the disadvantage of loss of polish, inability to reach into remote areas of denture and the increased possibility of dropping or damaging the denture while it is being scrubbed. The most commonly used denture base material acrylic resin has been shown to be relatively wear resistant to prolonged brushing provided that a proper brush and no severe abrasives are used<sup>12,13,15</sup>. (But it has been observed that wear on dentures increases with increasing length of the bristles of the brush<sup>16</sup>).

### CHEMICAL METHOD

#### CHEMICAL DENTURE CLEANSERS CAN BE DIVIDED INTO FOLLOWING GROUPS-

**Alkaline Peroxidase:** These are the most commonly used denture cleanser for daily overnight immersion that release oxygen bubbles which exert a mechanical cleansing effect. Electron microscopic studies have shown that prolonged immersion of acrylic resin in peroxide cleansers does not affect the surface of acrylic resin. But they may cause bleaching of acrylic resin.

**Alkaline Hypochlorites:** These chemical agents remove stains, dissolve mucin and organic substances and are bactericidal and fungicidal. These do not dissolve calculus but might inhibit calculus formation on dentures. Their use is effective with overnight immersion but because of bleaching, they should be used only intermittently (e.g. once a week).

**Acids:** Cleansers with bases of dilute acids are effective against calculus and stains on dentures<sup>13</sup>. Dilute acids such as Acetic acid may be used to dissolve calculus by overnight immersion, but only at weekly or biweekly intervals. Caution is needed in their use as they may be harmful to eyes and skin.

**Disinfecting agents:** It has been reported that Ethanol, Isopropyl Alcohol, Chloroform, Formalin and Acetic acid may be used for occasional disinfection of dentures and to avoid contamination from operator to laboratory and vice-versa<sup>7</sup>. The solution of chlorhexidine gluconate is unsuitable for daily denture immersion because of staining. A 1%-2% solution of chlorhexidine gluconate could be prescribed for denture immersion as an adjunct to specific anti-mycotic drug in treatment of candida induced denture stomatitis. A 0.1% solution of sodium salicylate may have a similar beneficial effect without causing staining. Immersion of dentures for a few minutes daily in a dilute solution of chlorhexidine causes stains. Gluconate or salicylate caused a significant reduction in amount of denture plaque and brought about an improvement in the denture-bearing mucosa in patients with denture stomatitis<sup>17-20</sup>. But these substances are unsuitable for daily use because of their bad odor and taste and their bleaching and crazing effects and because it is not known whether they have harmful biologic side effects.

**Enzymes:** These breakdown the glycol-proteins, mucoproteins and polysaccharides of plaque. No unwanted or harmful side effects have been reported from the use of enzyme-containing denture cleaners. Preliminary results with enzyme-based solution cleansers, using 15-minutes immersion period, which is more readily accepted by the patients than overnight immersion, are promising. However, it remains to be seen whether enzyme based cleansers are efficient enough to be substitute or merely adjunct to mechanical cleaning of dentures.

Efficient chemical denture cleansers might be important alternative to mechanical cleaning especially among geriatric complete denture wearers. The commercial denture cleaners appear to be harmless to denture plastics. Anthony & Gibbon's laboratory study found commercial chemical cleansers to be effective only in removal of stains<sup>9</sup>. However, Smith<sup>11</sup> found none of the tested commercial denture cleansers to be completely satisfactory in removing deposits. Theilade also found similar results<sup>7</sup>. However, he supported that hard soap and a properly designed denture brush would adequately clean a well-polished denture.

### IRRADIATION

Banting<sup>21</sup> demonstrated the effectiveness of irradiating dentures in a microwave oven for one minute at 850 watts. But this method cannot be used in case of repaired or relined dentures and in presence of ceramic teeth. It might be an

effective way of inoculating dentures for people who are at particular risk for pneumonia<sup>22</sup>.

### SONIC CLEANERS

The sonic cleaners employ vibratory energy to clean the dentures. They are effective in removing calculus, cigarette and coffee stains. Their action is synergistic with chemical cleansers.

### DISCUSSION

Proper hygiene care of removable complete denture is an important means of maintaining a healthy oral mucosa beneath the dentures. Dentures tend to accumulate microbial plaque and stains even more than natural teeth if not cleaned routinely. Black in 1885 recognized the presence of "leucocytes and microbes under plates". He stated that "cleanliness is chief preventive of sore mouth under plates"<sup>23</sup>. There is scanty literature available on disinfection of dentures with aid of denture cleansers or by other means. It seems that denture hygiene is often neglected by both patients and dentists.

Most of the denture-wearers report cleaning their dentures frequently. The least cleaned dentures are observed among elderly residents of old people's home. Regardless of their cleaning efforts, soft debris, bacterial plaque and dental calculus are often found on denture surfaces<sup>24</sup>. The preventive effect of cleaning may not be as good in elderly as it is in younger persons as reduced sight, dementia and reduced manual dexterity adversely influence self-care ability. The elderly understand that they should clean their teeth properly but are not aware of the poor results of their efforts<sup>25</sup>. The role of care-giver becomes more critical in performing daily oral hygiene as the oral hygiene habits have been found to be poor among the elderly<sup>26-28</sup>. Oral hygiene practices performed by attending nurses have been reported to be inconsistent and highly variable. Denture cleanliness is also reported to be generally poor and denture wearers seem to adjust easily to unclean dentures<sup>17,29</sup>. It may be due to improper mechanical cleaning and the relative inefficiency of most commercial products for chemical cleaning of dentures<sup>7</sup>. Dentists and patients should realize that microbial plaque on dentures may be harmful to both the oral mucosa and the person's general health. The candida infection in debilitated and ill patients, commonly seen in association with poor denture hygiene, may be the forerunner of a systematic and fatal candida infection<sup>4,8</sup>. It is, therefore, necessary to motivate and instruct the denture wearers to maintain denture sanitation. In addition to use of

denture cleansers to remove deposits and stains from the denture surface, the emphasis should be placed to sanitize dentures.

The polishing of tissue surface of removable complete dentures may be considered as a routine step in prosthodontic treatment as it has been shown that polishing of intaglio surface is conducive to improved denture hygiene. Also, it helps in healing of denture stomatitis without affecting retention of the dentures<sup>12</sup>. Traditionally, denture wearers have been advised to soak their dentures in water when not in use. However, evidence suggests that bacterial and fungal contamination of denture is much reduced when the dentures are dry when not in use<sup>30</sup>.

With increasing frailty in advanced age, there is a need to be more concerned about oral hygiene. The risk of aspiration pneumonia is increased substantially when accumulation of oral bacteria and fungi are high. Routinely, soaking for 30 minutes a day in an effervescent peroxide solution or in dilute bleach will suffice if denture is also brushed thoroughly with soap and water<sup>22</sup>.

### RECOMMENDATIONS AND CONCLUSION

Dentures will collect food while the patient is eating and little can be done to prevent it. Failure to remove such accumulation will lead to irritation of the mouth, bone resorption, denture stains and bad breath. A desirable method for denture cleaning is one that proves efficient in cleaning dentures and does not involve the use of a brush or abrasive. The routine denture cleaning regimen should be designed to remove and prevent accumulation of microbial plaque and also to remove mucin, food debris, calculus and exogenous discoloration. Patients need instructions and motivation concerning denture hygiene and denture removal. To facilitate denture cleaning, clinical and laboratory procedures used during denture fabrication should be directed to provide dentures with a smooth and homogenous surface<sup>7</sup>.

Patients should be recommended to meticulously clean the denture with a denture brush/tooth brush and soap/tooth paste at least once daily. Most common and easy to use method for denture care includes the use of brush and a suitable cleaning compound<sup>16</sup>. Patients should be cautioned against the use of hard brush, scrapers. Clean the denture storage box with soap and water or dispose it at least once a week. It is not possible for disabled people to brush a denture effectively<sup>22</sup>. Chemical denture-cleansing agents can be used in addition to cleaning with soap and water. In old

people's home, professional help with cleaning the denture is recommended. Although majority of geriatric complete denture wearers report cleaning their dentures and the underlying soft tissues regularly, many of them still show mucosal changes. Therefore, oral mucosa under denture should be frequently examined.

It is the responsibility of the patient to maintain oral hygiene through a daily home care routine and it is the obligation of the dentist to motivate and instruct the patient and provide the means and methods for plaque control. To avoid excessive wear, a paste with low abrasiveness and a relatively soft denture-brush or tooth brush should be recommended. Further research may be directed towards developing solution cleansers which can maintain plaque free dentures with a short soaking period and do not affect the color and surface luster of the denture acrylic resin.

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