

Effect of Complete Denture Teeth Wear on the Vertical Height of Teeth Using Different Types of Teeth (A Longitudinal Study)

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Abstract: This study was done on edentulous patients wearing complete dentures containing different types of artificial teeth, acrylic resin, porcelain and gold plated acrylic resin teeth, and measuring the amount of artificial teeth wear expressed in the decreases of the vertical length of the denture teeth by measuring the vertical distances between two reference points, one on the upper denture just above the first molar area, and the other on the lower denture just below the first molar area. This distance was measured using a caliper. Along the time it was observed that, the acrylic teeth had the most amount of wear followed by the gold plated acrylic teeth and lastly the porcelain teeth showed no wear observed.

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1. Introduction:

One of the foremost vital physical properties of artificial teeth employed in the restoration of the toothless patient is wear resistance, and also the ability of those teeth to keep up a stable occlusal relationship over time(1). The wear and tear resistance of artificial teeth is vital to the lifetime of the removable restorative for the toothless patient. The flexibility of artificial teeth to keep up a stable occlusal relationship over time could also be influenced by this property (2). Excessive wear might cause loss of the vertical dimension of occlusion, loss of masticatory efficiency, faulty tooth relationship, and fatigue of masticatory muscles (3,4). Materials used for denture tooth fabrication determine the wear resistance to a great extent (5). Acrylic resins and ceramics are commonly used for artificial teeth. Ceramic teeth have been considered the most wear resistant (5). However, due to the brittleness, the mismatch in coefficient of thermal expansion and the high modulus of elasticity, ceramic teeth are more likely to fracture and crack from the denture base than resin teeth (1,5). Convenient handling, better toughness, and better compatibility with the acrylic denture base give the acrylic resin teeth advantages compared to ceramic teeth (1,5). Therefore in removable dentures, resin denture teeth are usually used more frequently than ceramic teeth. Recently, several new types of resin denture teeth have been developed in order to retain the positive characteristics of acrylic resin teeth while improving their wear resistance. These teeth are made of cross-linked acrylics and micro-filled composite resins (6).

2. Materials and methods:

The right first molar areas (both maxillary and mandibular) of 3 types of denture teeth (acrylic resin teeth, gold plated acrylic resin teeth and porcelain teeth) were notched and the distance between the two notches were measured using a caliper after one year, two, three, four and five years of wearing the dentures in 90 edentulous patients divided into three equal groups each of 30 patients. The first group wearing dentures with acrylic teeth, the second group wearing dentures with gold plated acrylic teeth, and the third group wearing dentures with porcelain teeth.

3. Results:

The results are shown in Tables 1, 2 and Figures 1, 2.

Table (1): The mean \pm SD values of the vertical height loss

Teeth type	One year	Two years	Three years	Four years	Five years
Acrylic	1.50 \pm 0.58	1.45 \pm 0.55	1.30 \pm 0.50	1.20 \pm 0.45	1.15 \pm 0.40
Gold-plated acrylic	2.00 \pm 0.85	2.00 \pm 0.85	1.98 \pm 0.83	1.97 \pm 0.82	1.94 \pm 0.78
Porcelain	2.20 \pm 0.90	2.20 \pm 0.90	2.20 \pm 0.90	2.18 \pm 0.89	2.17 \pm 0.88

Table (2): Anova test between the three groups

Source of variation	Sum of squares	d.f.	Mean squares	F
Bet.	2.463	2	1.232	169.8
Total	2.572	17		

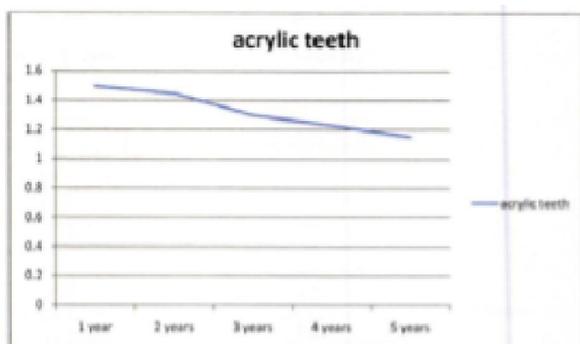


Figure (1): The first means \pm SD values of the vertical height in the first group

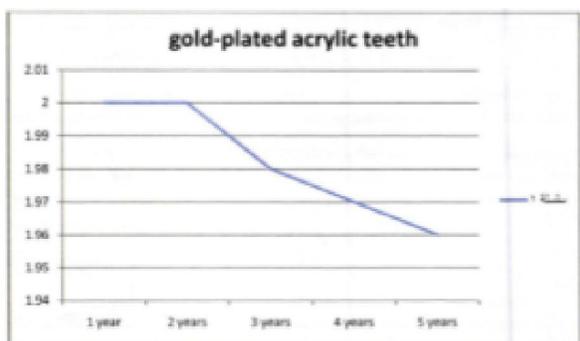


Figure 2. Gold-plated acrylic teeth

4. Discussion:

To give superficial damage of occlusal contact surface; second, abrasive wear by abrasive particles in the food or the wear debris loss from a surface through the mechanical cutting action (rubbing or friction) of a secondary material, which is in relative motion to the fist surface, and third, erosion by the mechanical removal of food flow from a surface(7). One recent study compared 10 different dental restorative materials in five wear simulators with a round robin test (8). The results showed that among the five wear simulators one wear simulator named as IVOCLAR (vertical loss) was the best with the respect to the coefficient of variation. The variables relating to the same method largely agreed with one another (volumetric and vertical wear). This computer controlled chewing simulator presented (9) the simultaneous simulation of wear mechanics and temperature change. Therefore, in another study, this kind of two body chewing simulator was used to compare the wear resistance of several artificial teeth. The teeth were loaded with total of 1.200.000 cycles, which is equivalent to 5 years of clinical service (6). Thermal cycling was used as artificial aging to obtain an increasing wear effect (10, 11).

Conclusions:

Within the limits of this study, the following conclusions were drawn: 1. Porcelain denture teeth demonstrated the least wear tendency. 2. Acrylic teeth tested showed statistically higher wear tendency than both gold-plated and porcelain teeth. 3. The acrylic resin teeth showed differences in their wear amounts which were not statistically significant.

Recommendations:

From the present study, it is recommended to use porcelain teeth in fabrication of complete or partial dentures.

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