SHIGAKU 77 (2) : 598-606, 1989

Recent, improvements made in toothbrushes have been remarkable, with many types of approaches being taken.

Toothbrushes with a semiconductor have been gaining a lot attention lately. The TiO_2 semiconductor is buried in the neck region of the toothbrush. In theory, it converts light to electrochemical energy when light strikes the n-type semiconductor. It has already been reported that TiO_2 powder decomposes lactic acid [2, 3], and TiO_2 has received a lot attention since it was advocated that TiO_2 has an effect against *Streptococcus mutans*, a microorganism which is particularly closely related to dental caries.

The present investigators report on the results of a comparison between conventional toothbrushes and the TiO_2 semiconductor toothbrush by focussing on the condition of the dental plaque and gingival tissue in dental hygiene school students, subjects who are relatively knowledgeable with respect to oral hygiene.

Materials and Methods

1. Experimental materials

The toothbrush used in the study was a photo energy conversion toothbrush equipped with a TiO_2 semiconductor. The toothbrush was manufactured by Shiken Corporation (Osaka, Japan) and is shown in Figure 1. The conventional toothbrushes used by the control group were not equipped with a semiconductor but were of the same type as those used by the experimental group (Table 1). The composition of the toothpaste used in the present study is shown in Table 2.

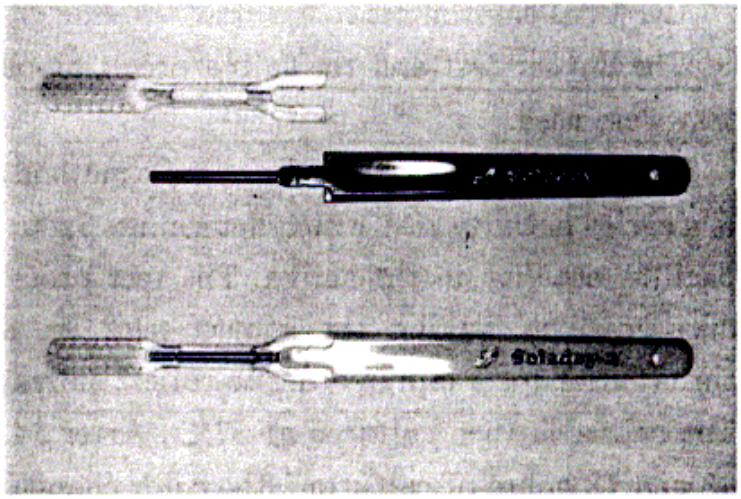

Fig. 1. Solar energy conversion toothbrush

Table 2. Toothpaste composition

	(%)
Precipitated Calcium Carbonate	35.0
Glycerin	36.0
CMC-Na	1.6
Flavor	0.7
Distilled water	36.7

school students aged 18–22 who had normal dentition and no clinical signs of any dental diseases.

3. Experimental procedure

The subjects were randomly divided into 2 groups, one group of 32 which used the semiconductor toothbrush (experimental group) and another group of 28 which used the conventional toothbrush (control group). Prior to commencing the study, the subjects practiced brushing until they had mastered the technique. The subjects' oral conditions were examined prior to the experiment. The toothbrushes were then distributed and the subjects' oral conditions were examined 1, 2 and 3 weeks later. The particular conditions were specified with respect to the intensity of illumination or light source

2. Subjects

The subjects consisted of 60 dental hygiene

for the normal daily brushing environment.

4. Evaluation criteria

Table 1. Toothbrush specifications

Total Length	Head Length	Width	Thickness	Tuft Design	Filament Length	Filament Diameter	Filaments Per Tuft
166	23	9	4.9	3×8	9.5	0.2	24 ± 1