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Comparison of the clinical effectiveness of a single and a triple-headed toothbrushes in a population of mentally retarded patients

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SUMMARY

Tooth brushing is a very simple and effective method for removing daily dental deposits and for preventing dental and periodontal diseases. However, it can cause considerable manipulative difficulties among some populations, e.g., young children, physically handicapped and mentally retarded patients. In order to test and compare the efficiency of a newly designed toothbrush (Superbrush® [1]), we have performed a pilot study on patients staying at the «Reine Fabiola Village N° 1», an institution for patients who are followed for mental retardation at different levels. 30 patients were included in the study, aged between 18 to 40 years. Among these 30, five had to be eliminated for their incapacity to follow the initial training in how to brush their teeth. The comparison was made with a normal single headed tooth brush, in a double blind trial, based on bleeding and plaque indexes, performed on 6 different teeth on day 0, 7 and 21. The results of this study indicate that there is no significant difference between the two types of toothbrushes with respect to the ability of plaque removing and gingivitis prevention, during the period of time of this study. However, the easiness of manipulating this newly designed toothbrush renders it a useful tool for the dental hygiene for this special part of the dental compromised population.

KEY WORDS:

Dental hygiene, Population of mentally retarded, Triple-headed toothbrushes.

RÉSUMÉ

Le brossage des dents constitue une méthode simple et efficace pour ôter le dépôt dentaire journalier, et pour empêcher les maladies dentaires et parodontales. Cependant, le brossage peut engendrer des difficultés de manipulation au sein de certaines populations, chez les jeunes enfants par exemple, ou chez les handicapés physiques ou encore chez les retardés mentaux. En vue de tester et de comparer l'efficacité d'une nouvelle brosse à dents avec un nouveau design (Superbrush® [1]), nous avons réalisé une étude pilote sur des patients résidant au «village Reine Fabiola n° 1», une institution pour personnes retardées mentalement à différents niveaux. Notre échantillon s'est composé de 30 patients âgés de 18 à 40 ans. Parmi ceux-ci, cinq ont été éliminé suite à leur incapacité de suivre les explications initiales concernant les méthodes de brossage. Nous avons vérifié l'efficacité de la nouvelle brosse en comparant le saignement et les index de plaque dentaire par rapport à ceux obtenus avec une brosse à tête unique. Ces tests ont été réalisés sur 6 dents différentes, au jour 0, 7 et 21. Les résultats de cette étude indiquent qu'il n'y a pas de différences

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significatives entre les deux types de brosses à dents quant à leur efficacité d'ôter la plaque et d'empêcher les gingivites pendant la période étudiée. Cependant, vu la facilité de manipulation de la nouvelle brosse à dents, celle-ci peut s'avérer être très utile pour l'hygiène dentaire de certaines catégories de population.

MOTS-CLÉS:

Hygiène dentaire, Retardés mentaux, Brosses à dents à trois têtes.

INTRODUCTION

Tooth brushing is an effective method for fighting dental diseases. Prophylaxis and prevention are achieved by reducing the accumulation of the supragingival bacterial plaque (Schmid et coll. 1976, Suomi 1971, Van de Wejden et coll. 1993). The lack of technical skills reduces the effectiveness of tooth brushing for several parts of the population, e.g., small children, handicaped and mentally retarded patients. Many sorts of toothbrushes were proposed to give an effective solution for these people and to provide a better control of the supragingival bacterial plaque (Horowitz and Suomi 1974).

Recently, a Norwegian dental research laboratory proposed a new kind of toothbrush (Superbrush®), presenting three heads (Fig. 1) and consequently permitting to brush simultaneously each teeth on it's buccal, occlusal and lingual aspects (Fig. 2). Similar toothbrushes were found already to be superior to conventional toothbrushes in their ability to remove plaque (Batisaan 1984, Bastiaan 1986, Bay et coll. 1967, Gibson et coll. 1988).

The aim of this study was to find out whether a difference exists between the Superbrush® and a single headed conventional toothbrush, in their ability to reduce the accumulaion of the supragingival bacterial plaque. For studying this, we deliberately choose a specific population of mentally retarded patients, in order to compare their ability to control plaque and gingival bleeding, by using a double blind trial during a period of three weeks.

MATERIAL AND METHODS

All patients were recruited randomly from the clinical institute «Reine Fabiola Village N° 1» (Braine-l'Alleud, Belgium). 30 patients were included in the study, aged between 18 to 40 years. Among these, five had been eliminated for their incapacity to follow the initial training to brush their teeth as was required.

The study got the permission of the «Helsinki commission» of the Brugmann University Hospital. The authors respected all through the study the «Helsinki declaration» (1989).

Patients were excluded from the study if:
- received an antibiotic treatment 3 months before the study was started;
- are receiving any medical treatment that may influence their mouth's micro biological flora or the state of their gums (Hydantoine);
- were pregnant.

Al the beginning of the study (Day 0), a periodontist recorded from each patient, plaque index (Löe and Silness, 1964) and bleeding index (Saxer and Muhlemann, 1975), from 6 different teeth [16, 21, 24, 36, 41, 44 and if missing – the most adjoining posteriorely tooth was recorded (Ramfjord 1959)] from three different sites [buccal (B), mesial (M), lingual (L)]. Just after the recording of the indexes, a toothbrush was distributed to each patient by an oral hygienist – either the Superbrush® regular for adults or Oral-B P35®[2].

Fig. 1: The Superbrush® presenting three heads.
Fig. 1: Superbrush®, brosse à dents à trois têtes.

2 Coopercare Inc., Fairfield, New-Jersey, USA.
3 Colgate-Palmolive Inc., England.

Fig. 2: Superbrush ® permitting to brush simultaneously each tooth.
Fig. 2: La brosse à trois têtes permet le brossage de toutes les faces des dents dans un seul mouvement.

All the patients received the same toothpaste (Colgate ®) and were instructed how to brush their teeth, by using the simplest method (horizontal movements with short strokes). The patients were asked to brush their teeth regularly twice a day for at least 60 seconds.

Seven days later (Day 7), plaque and bleeding indexes were recorded (by the same practitioner) from each patient, then, each patient received once again individual instructions how to brush his/her teeth.

Fourteen days later (Day 21), plaque and bleeding indexes were recorded (by the same practitioner) from each patient for the last time – End of the study.

PLAQUE INDEX

Plaque index (Silness and Löe, 1964) was performed using the following scale:

0: no plaque.
1: thin film at the gingival margin.
2: moderate amount of plaque along the gingival margin.
3: heavy plaque accumulation at the gingival margin.

BLEEDING INDEX

Bleeding upon probing (Saxer and Muhlemann, 1975) was determined using a «Sawe» standerized probe, and recorded immediately. Presence/absence of bleeding at the experimental sites was recorded using the following scale:

0: no bleeding.
1: sparse, a light red dot in the inter proximal area.
2: intermediate, a line of blood.
3: extensive, a dark red bleeding forming drop and/or covering parts of the tooth and the adjacent gingiva.

DATA ANALYSIS

Mean, standard deviation and the linear regressions were calculated using the classical methods. Fisher-Snedecor test and Students T-test were performed to verify whether a difference between the two toothbrushes utilised does exists, in the regard to the plaque and bleeding indexes recorded from each patient, during the period of the study.

RESULTS

Plaque index

As reported in Table 1 and Fig. 3, the means of plaque indexes are decreasing for the two toothbrushes utilised, and the difference between the recording on day 0 to day 7 or day 21 were statistically significant. However, no significant differences were found between the two toothbrushes in the means of day 0, 7 or 21.

When buccal, mesial and lingual surfaces are considered, the results showed a statistically significant decrease of the plaque index for each one of the two toothbrushes. However, statistically, no significant difference could be observed between the two brushes.

Bleeding index

As reported in Table 1 and Fig. 4, the means of bleeding indexes decreased during the study, independently of the type of toothbrush. This decrease was statistically significant. No significant difference was found when the results of bleeding indexes were compared between the two toothbrushes.

TABLE I: Plaque and bleeding indexes obtained from the Superbrush ® and for Oral B-35 ®

				Surface			
Index	**Toothbrush**	**Day**		**General**	**Buccal**	**Mesial**	**Lingual**
Plaque	Superbrush	0	Mean	1.48	1.57	1.55	1.34
			Sd	0.76	0.78	0.77	0.71
		7	Mean	1.10	1.09	1.27	0.97
			Sd	0.96	1.02	0.90	0.93
		21	Mean	1.02	0.96	1.15	0.99
			Sd	0.85	0.85	0.86	0.83
Plaque	Oral-B	0	Mean	1.46	1.53	1.44	1.40
			Sd	1.01	1.42	0.71	0.69
		7	Mean	1.10	1.05	1.18	1.08
			Sd	0.85	0.89	0.78	0.86
		21	Mean	0.82	0.62	0.89	0.95
			Sd	0.81	0.80	0.90	0.89
Bleeding	Superbrush	0	Mean	1.97	1.77	2.18	1.97
			Sd	0.95	0.85	1.05	0.92
		7	Mean	1.40	1.19	1.62	1.40
			Sd	0.97	0.94	1.03	0.91
		21	Mean	1.21	1.10	1.035	1.19
			Sd	0.85	0.83	0.90	0.81
Bleeding	Oral-B	0	Mean	2.13	1.90	2.47	2.03
			Sd	0.82	0.73	0.94	0.69
		7	Mean	1.45	1.28	1.64	1.45
			Sd	0.77	0.77	0.74	0.78
		21	Mean	1.31	1.02	1.52	1.38
				0.87	0.72	1.02	0.78

Sd: Standard deviation

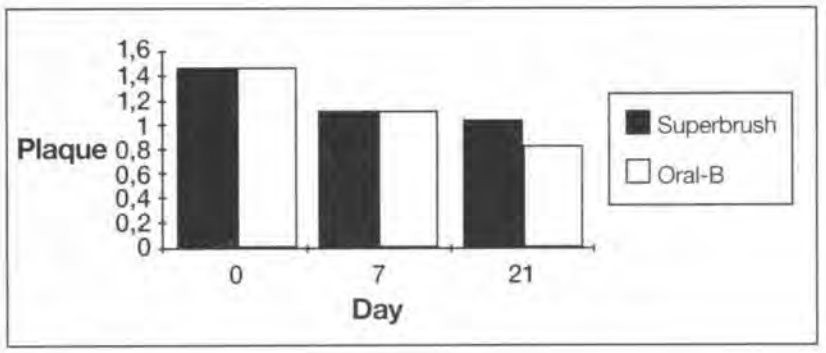

Fig. 3: Plaque index evaluation according to the days for the Superbrush ® and for Oral-B P35 ®.
Fig. 3: Evaluation de l'index de plaque dentaire correspondant à l'utilisation de Superbrush ® et de Oral-B P35 ®.

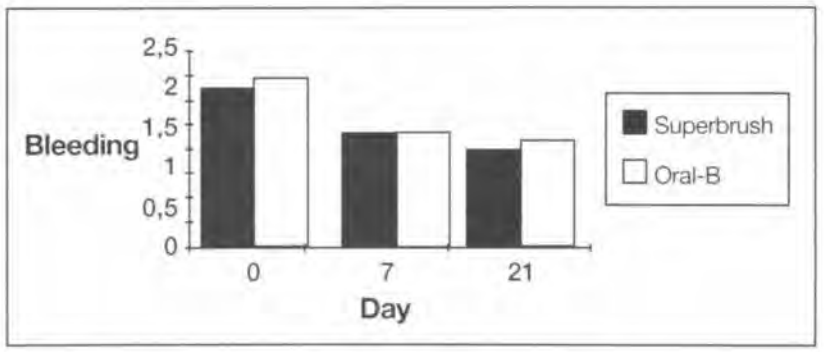

Fig. 4: Bleeding index evaluation according to the days for the Superbrush ® and for Oral-B P35 ®.
Fig. 4: Evaluation de l'index de saignement pour Superbrush ® et pour Oral-B P35 ®.

The comparison of bleeding indexes from buccal, mesial and lingual surfaces showed statistically a significant decrease for each surface, for each of the two toothbrushes between day 0 to day 7 and day 21. These decrease were found to have no significant difference between the two toothbrushes for each of the surface by it's own.

DISCUSSION

Limiting plaque accumulation during the life time is the principal goal of the dental practitioner and oral hygienist. Unfortunately, age, social conditions, illness and physical/mental handicaps are often sources of insufficient oral hygiene habits. Since the wooden toothpick were introduced to modern techniques, generations of dentists have aimed to find the new methods permitting to avoid or limit dental diseases. Up to now, no miracles have been obtained.

In this study based on the comparison between a new design of toothbrush and a usual one, no significant difference was found between the two in their efficiency in controlling of plaque. This is different from the results obtained earlier (Bastiaan, 1984, Gibson et coll. 1988) concerning similar kinds of toothbrushes, which were found to clean lingual surfaces better than the conventional brushes.

Even though no significant difference was found between the two toothbrushes in their efficiency in controlling plaque, we noticed from our own experience the great facility to demonstrate how to use the triple-headed toothbrush in comparison with the usual one, especially in the population we studied. In regard to this, and by the fact of their equivalent efficiency, we assume that the Superbrush ® should be recommended to specific populations, where the manipulation of normal methods of oral hygiene or the understanding of their necessity are lacking, namely: physical or mental handicaps, young children, older patients suffering from physical or eye problems. Moreover, we propose the use of this toothbrush to patients not able to brush their teeth by themselves, because of the dexterity to use it by a nurse or a relative.

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