



POWERED TOOTHBRUSH- A BOON FOR THE AUTISTIC CHILDREN

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ABSTRACT

The aim of the study is to evaluate the effectiveness of manual and powered tooth-brushing autistic children between 6- 12 years. 40 autistic children between the age group of 6-12 years were randomly selected. Baseline oral status was checked by simplified oral hygiene index (OHI-S). Children were divided into 2 groups. Group 1 was given powered toothbrush and to group 2 manual tooth brush. The index was checked again at the end of 1st and 2nd month. A statistically significant reduction in the mean OHI- S scores was observed in group 2, while in group 1 there was highly significant reduction. Powered tooth brushing shows promising result even in autistic children.

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INTRODUCTION

Autism is a neurodevelopmental disorder in the category of pervasive developmental disorders, and is characterized by severe and pervasive impairment in reciprocal socialization, qualitative impairment in communication, and repetitive or unusual behavior. The Diagnostic and Statistical Manual of Mental Disorders, (DSM-IV)¹ and the International Classification of Diseases,(ICD-10),² include autistic disorder, Asperger's syndrome, Pervasive Developmental Disorder-Not Otherwise Specified (PDDNOS), Rett's syndrome, and childhood disintegrative disorder as pervasive developmental disorders.

After teeth have been cleaned by the individual, soft microbial dental plaque reforms on the tooth surfaces. With time, plaque is the primary agent in the development of caries, periodontal disease, and calculus. If plaque, particularly at interproximal areas, is completely removed with home-care procedures, these dental-disease conditions can be prevented. Unfortunately, the majority of the population is unable, uninstructed, remove plaque from all tooth surfaces, and/or the product(s) used are not adequate to remove plaque at critical sites.

Manual toothbrush consists of a head with bristles and a handle. Toothbrushes also differ in their defined texture, usually being classified as hard, medium, soft or extra soft. Much of the data comparing the efficacy of various designs is contradictory because of (1) the lack of quantitative methods used to measure cleaning (plaque removal), (2) the many sizes and shapes of toothbrushes used, and (3) the lack of standardized tooth brushing procedures used in the studies.³

Powered toothbrushes were first advertised in Harper's Weekly in February 1886,⁴ but only came in the U.S. marketplace beginning in the 1960s with the introduction of Broxadent. The head follows three basic patterns when the motor is started: (1) reciprocating, (2) arcuate and (3) elliptical, a combination of the reciprocating and arcuate motions. These toothbrushes are consistently superior to manual toothbrushes in plaque removal and gingivitis efficacy.⁵

Motivation to improve oral hygiene appears to be a key factor for patients to purchase powered toothbrushes. Powered toothbrushes are beneficial for parental brushing of children's teeth; for children and adults who are physically handicapped, mentally retarded, aged, arthritic, or otherwise with poor dexterity. These brushes are especially recommended for patients who require a larger handle, because powered models are easier to grasp.

The General Considerations of Autistic Child

- High incidence of caries and periodontal diseases because of reduced access to care and difficulty in daily oral care maintenance⁶⁻⁸
- Lack of necessary manual dexterity of autistic children.
- Preference for soft and sweetened foods
- Pouching of food inside the mouth instead of swallowing it due to poor tongue coordination
- Psychoactive drugs or anticonvulsants drug therapy which can cause generalized gingivitis as side-effects.⁹

The utilization of health care in children with special needs is reported to be low in India. Therefore an understanding of the oral health status of autistic children and their specific needs is essential to render quality oral healthcare.

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Hence the aim of the study was to evaluate the effectiveness of manual and powered tooth-brushing in autistic children between 6- 12 years.

MATERIALS AND METHODS

Ethical clearance

The Research Ethics Committee of A J Institute, Mangalore, gave the approval for the study (AJEC/REV/191/ 2017).

Source of data

40 autistic children between the age group of 6-12 years were randomly selected from the schools of mangalore city based on fulfilling the following inclusion and exclusion criteria

Inclusion Criteria

1. Children diagnosed with autism of 6-12 years old.
2. Children with fully erupted permanent first molar and central incisor
3. Having fair- poor oral hygiene.
4. Children who are able to hold tooth firmly in one hand.
5. Those who can follow basic instructions and simple fine motor movements
6. Children who are not using powered tooth brush.

Exclusion Criteria

1. Children who are on anti-epileptics like phenytoin, sodium valproate, phenobarbitone, ethosuximide, methosuximide or steroids.
2. Uncooperative children.
3. Those with cerebral palsy or any other mental disorders
4. Children with any systemic disease.
5. From whom parental consent will not be obtained.

Study Design

Permission from the special school authorities was obtained before the study and a written informed consent was obtained from the parents of the participants involved in the study.

Data collection

Children were examined in the institution on an adjustable office chair, or in knee to knee position depending on their age and physical condition, accompanied by his/her trainer/teacher. All the children were examined under good illumination under natural light or hand torch using a sterile mouth mirror and no.23 explorer while taking protective cross infection measures using disposable gloves and masks by a single examiner.

Baseline oral status was checked by simplified oral hygiene index (OHI-S)¹⁰.

Clinical examination

- The OHI-S has two components, the Simplified Debris Index (DI-S) and the Simplified Calculus Index (CI-S).
- 6 teeth will be examined-upper, lower 1st molars, upper right central incisor and lower left central incisor.

Debris Index -Simplified: scored 0-3 based on debris or stain present.

Calculus Index -Simplified: scored 0-3 based on supragingival and subgingival calculus present

During examination, when participants were uncooperative, additional approach was used to encourage the co-operation

the use of basic behavior management techniques (tell-show-do technique, short, clear verbal commands). The index was checked again at the end of 1st month (30th day), and 2nd month (60th day).

Following oral examination, children were divided into 2 groups.

Children in group 1 were given powered tooth brush (Colgate 360° sonic power toothbrush, Colgate-Palmolive Company, 300 Park Avenue, New York City, New York, United States) generating high energy sonic oscillations of 20,000 oscillations per min. and to group 2 manual toothbrush (Colgate 360° toothbrush, Colgate-Palmolive Company, 300 Park Avenue, New York City, New York, United States) The circular fone's technique was taught to the children.

Children were taught to brush for 3 minutes under the supervision of care providers. They were taught to brush each segment both buccal and lingual by counting from 1- 20. To all children demonstration of tooth brushing was done using a study model and a tooth brush and each child was asked to demonstrate the brushing he/she learnt.

Statistical Analysis

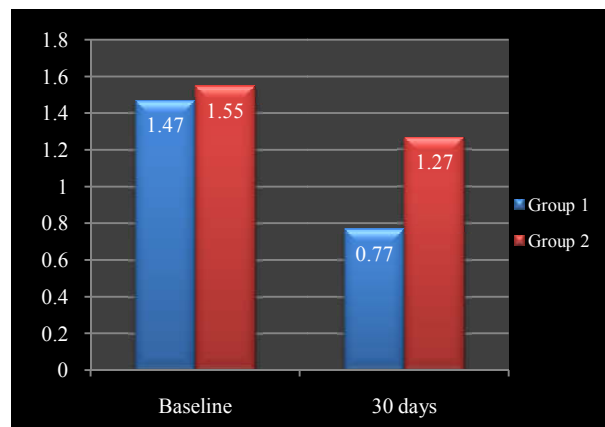
SPSS (Statistical Package For Social Sciences) version 20. [IBM SPASS statistics (IBM corp. Armonk, NY, USA released 2011)] was used to perform the statistical analysis

RESULTS

The study population show that a total of 40 children were included in the study ranged from 6 to 12 years with a mean age 8.60 (±1.23)years in group 1 with 4 females, 16 males and 9.75 (±1.7) in group 2 with 5 females, 15 males. Table 1 and graph 1 show that at the end of 30 days there was reduction in the mean OHI-S score in both the groups, with significant reduction seen in group1. Table 2 and graph 2 show that a statistically significant result was observed within the groups at the end of 30 days (p=0.00*) but a greater reduction was seen in group 1.

Table 1 Comparison of the Mean Values of Ohi Index at Baseline and 30 Days between the Groups Using Independent Sample T Test

		Minimum	Maximum	Mean	Std. Deviation	Mean diff	P value
Baseline	Group 1	0.50	2.42	1.47	0.47	-0.07	0.90
	Group 2	0.67	2.75	1.55	0.53		
30 days	Group 1	0.16	1.75	0.77	0.32	-0.50	0.07
	Group 2	0.50	2.33	1.27	0.48		

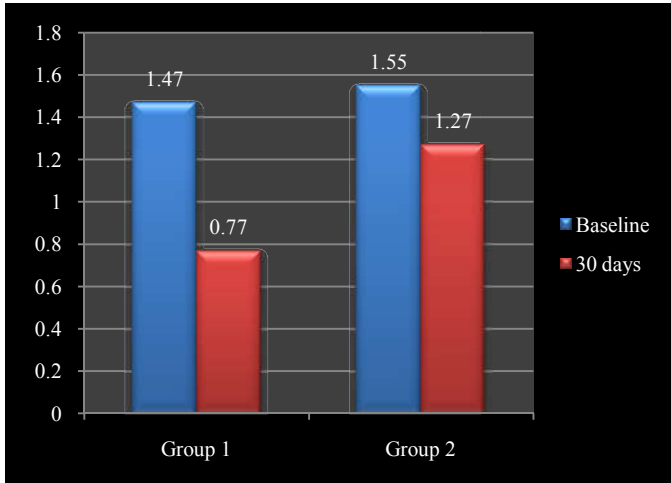


Graph 1 Comparison of the Mean Values of Ohi Index at Baseline and 30 Days between the Groups

Table 2 Comparison of the Mean Values of Ohi Index At Baseline and 30 Days Within The Groups Using Paired Sample T Test

		Minimum	Maximum	Mean	Std. Deviation	Mean diff	P value
Group 1	Baseline	0.50	2.42	1.47	0.47	0.69	0.00*
	30 days	0.16	1.75	0.77	0.32		
Group 2	Baseline	0.67	2.75	1.55	0.53	0.27	0.001*
	30 days	0.50	2.33	1.27	0.48		

*significant



Graph 2 Comparison of the Mean Values of Ohi Index At Baseline And 30 Days Within The Groups



Figure 1 Manual and powered toothbrush



Figure 2 colgate fluoride less tooth paste

DISCUSSION

Maintenance of proper oral hygiene in handicapped individuals is known to be difficult because of psychological and physical limitations and hence powered toothbrush may be better suited for them. In a study of autistic population in India, it was found that autistic patients frequently needed assistance in brushing had a higher rate of periodontal disease and lower caries compared to controls.¹¹ Thus, the primary outcome of this study was to achieve lower OHI scores. The purpose of the present study was to assess the effectiveness of brushing using manual and powered toothbrush among the institutionalized autistic children under supervision of trained caretakers. Powered toothbrushes, which were introduced in the 1960s, as an alternative to manual toothbrushes are known to be beneficial in patients with special need.¹² It is easy to handle, require lesser manual efficiency, and facilitate effective tooth cleaning either used by the child or assisted by the parents/caretaker, are very helpful. Powered toothbrushes when compared to manual toothbrush have the potential to improve oral hygiene by achieving plaque reduction as evident in our study after 30 days.¹³

The brushing method used in this study was fone’s method as it is easy and takes shorter time for the physically or emotionally handicapped individuals to learn. It is also recommended for young children and others, who do not have muscle development for more complex technique. This is in accordance with the study conducted by Vajawat M.¹³

The age group selected was appropriate, considering the American Dental Association recommends that ideally, an adult will brush and floss a child’s teeth until he or she is at least 6 years old. By age 6 or 7, children should be able to brush their own teeth twice a day – with supervision until about age 10 or 11 — to make sure they are doing a thorough job¹⁴. Fluoride less tooth paste was provided to all children to eliminate fluoride toxicity as the autistic children have a tendency towards sweet food and may swallow the tooth paste. This is in agreement with Vajawat M.¹³

The significant improvement of oral hygiene in the group 1 can be attributed to the ease of using powered toothbrushes with lesser effort. In addition, the numbers of oscillations in the powered toothbrushes are predetermined, whereas, in the manual toothbrushes, the number of strokes is dependent on patient's dexterity which is in agreement with Vajawat M.¹³ Also the powered toothbrush has proven to play a major role in enhancing patient compliance and motivation which is in accordance with Hofer *et al* and Hafajee *et al*^{17, 18}. It has been seen that powered toothbrushes also have “novelty effect” that helps to increase the compliance.

The findings in this study provide evidence for the use of powered tooth brush even in autistic children with manual dexterity to help them improve their oral hygiene.

Some of the drawbacks of this study are the duration of the study period which was only three months which may have been a relatively shorter period to assess the long term effects on the oral hygiene status of autistic children. Even though there was a significant reduction in the oral hygiene scores, the study population was only 40. Repeated motivation with a long term follow up and larger sample size would help in achieving acceptable oral hygiene levels.

CONCLUSION

Powered toothbrushes have a “novelty effect” that helps to increase the compliance as it requires lesser effort on the part of the individual by virtue of their automated action. The present study showed that children not only learnt to brush, but did it so effectively which reflected in the significant reduction of mean OHI-S scores. A steady decrease in the baseline OHI-S with time was observed which provides evidence that oral hygiene in autistic children can be improved using powered tooth brushing. Hence from the study we can conclude that powered tooth brushing shows promise even in autistic children. However, long term follow up with larger sample size are needed.

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