

Effectiveness wall mounted automatic toothbrush against oral hygiene on cerebral palsy children at SMPLB and SMALB D YPAC Jember



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Abstract

Objective: Cerebral palsy (CP) is a postural syndrome and non-progressive motor disorder due to pyramida and extrapyramidal tract damaged that causes limited motor activity and often accompanied by cognitive impairment or visual deficits. Limited motor activity causes the process of brushing teeth to be hampered so that oral hygiene becomes low. Nowadays there many types of toothbrushes that required difficult motor activities so it is not effective for children with CP. Wall Mounted Automatic Toothbrush with an automation system es expected to help CP children maintained their oral hygiene.

Material and Methods: This study was clinical experimental with one group pretest posttest design in 5 samples in SMPLB and SMALB D

YPAC Jember. Data analysis was the One Way Anova and Post-Hoc test using the Least Significat Different. The Material of this study is wall mounted automatic toothbrush and manual toothbrush, both of them is used by children with cerebral palsy

Results: There are significant differences between all treatment groups. The lowest of Silness and Loe plaque index of all treatment groups is the treatment group after brushing teeth with manual toothbrush.

Conclusion: The conclusion of this study is wall mounted automatic toothbrush can improve oral hygiene measured by the Silness and Loe plaque index.

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Keywords: Cerebral palsy, Oral hygiene, Silness and Loe plaque index, Wall mounted automatic toothbrush

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Introduction

Cerebral palsy (CP) is one of the brain injuries that are part of the involuntary, which is a movement disorder, attitude, or body shape, coordination and can overcome psychological and sensory disorders, caused by safety or disability during brain development. Motor limitations that are determined by CP children as well as low saliva flow, limited diets, and less knowledge about dental hygiene that cause difficulties in preventing prevention of dental and oral hygiene especially in the case of brushing teeth with regular toothbrushes.¹⁻³ CP prevalence continues to increase from 1.5 children per 1000 births in the 1960s to 2.5 children per 1000 births in the 1990s In Indonesia, the prevalence of CP patients is estimated to be around 1–5 per 1,000 births.^{4,5}

CP Kids are so much in need of particular concern to deal with, especially in the case of oral hygiene. Dental abnormalities in children with a high prevalence of caries.⁶ Based on research conducted in India, 53.2% had low oral and dental hygiene (OHI-S index), 43.6% severe gingival inflammation (MGI index), and 86.53% of caries in CP children who almost as large as child caries in general.^{7,8} So that oral hygiene is an important thing to be kept.

Dental care for children with special needs is actually not much different from normal patients,

but the provisions for treatment of actions are usually more difficult and require patience.⁹ Efforts to maintain clean and healthy teeth and mouth by regularly brushing teeth at least 2 times a day.¹⁰ Currently there are many types and shapes of toothbrushes in circulation that can be used to reduce plaque accumulation. However, in terms of its use for children with special needs, especially CP children are still less effective in cleaning teeth and mouth so that they need new innovations to overcome children's problems CP. Automatic wall mounted toothbrush can be a solution to overcome the problem of limited motor movement coordination so that it can facilitate CP children in maintaining dental hygiene.

This automatic wall mounted toothbrush is one of the electric toothbrushes with an automatic system that is able to increase access to cleaning dental plaque in the interproximal and lingual parts of the teeth, does not require a specific tooth brushing technique, uses mild strength than a manual toothbrush, in some toothbrushes electrically there is a timer / timer that regulates the length of time brushing your teeth so that it is more helpful for patients to brush their teeth in accordance with the time needed. Wall mounted automatic toothbrushes

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function as a child's CP tool to reduce the accumulation of debris and plaque that does not require a lot of motor movement. Automatic wall mounted toothbrushes also have a toothpaste to remove toothpaste on a toothbrush and spray water to rinse after the tooth brushing process is complete. So that makes it easier in the process of brushing teeth to maintain children's oral hygiene CP.^{10,11}

Material and Methods

This type of research is experimental clinical with a one group pretest posttest design study. Observations were made before (pre-test) and after (post-test) treatment.^{12,13} The study aimed to determine the use of automatic wall mounted toothbrushes for improving oral hygiene of CP children by measuring the calculation of Silness and Loe plaque index. The study was conducted at the SMPLB and SMALB YPAC Jember. Research has received approval from the Ethics Commission of the Faculty of Dentistry, University of Jember. The study population was students of SMPLB and SMALB D YPAC Jember. The research sample used was children with cerebral palsy. The sample is taken by means of total sampling, which is a sampling taken by using the entire population in conducting research. The results of the survey found 3 samples in the SMPLB D YPAC Jember, and 2 samples at SMALB D YPAC Jember.

After the process of making and testing the tool is complete. There are 3 tests in each sample. First, the pretest on the research subject by examining the Silness and Loe plaque index before brushing your teeth. Second, the posttest test on the research subjects by checking the Silness and Loe plaque index after brushing your teeth using an automatic wall mounted toothbrush. Third, a comparative test on the research subject by examining the Silness and Loe plaque index after brushing your teeth using a conventional toothbrush.

Statistical analysis of the data obtained was carried out by Saphiro-Wilk Test normality test and

homogeneity test using Homogeneity of Variances with Levene. If the results of the calculation of the data are stated as normal distribution, then proceed with parametric tests. The data obtained were tested by One Way Anova parametric statistical analysis to see comparisons from each group, if the data obtained were not normally distributed then Kruskal Wallis non parametric test was conducted with Mann Whitney follow-up test.

Results

Data on calculation of Silness and Loe plaque index scores in cerebral palsy children in SMPLB and YPAC Jember SMALB D are presented in [table 1](#).

The results of the research data are carried out by the Shaphiro-Wilk normality test and variance homogeneity. Based on the normality test, it is known that the research data is normally distributed. The variance homogeneity test results show that the data variant is homogeneous ($p > 0.05$) which means that H_0 research is rejected, where H_0 means the data group comes from a population with different variances (not homogeneous). The results of the normality and homogeneity tests obtained are data with normal distribution and homogeneous variance. Then the data was tested with One Way Anova to find out the differences in the groups. The One Way Anova test showed that there were significant differences in each group ($p < 0.05$) which meant that H_0 research was rejected, there were significant mean differences in all groups. Then the Least Significant Different test was carried out to find out the differences between the groups presented in [table 2](#).

The results of the Least Significant Different test indicate differences between groups if the significance value is less than 0.05 or marked with an asterisk (*). The results of this test show that the results of the Silness and Loe plaque index examination after brushing using an automatic wall mounted (posttest) toothbrush with examination after brushing using a conventional toothbrush (comparative test) have a significant difference.

Discussion

The study aims to determine the effectiveness of the automated tools, wall mounted toothbrush so that the measurement of plaque index research on the subject. The researcher used measurements of the Silness and Loe plaque index in all teeth of the study subjects. The measurement of the Silness and Loe plaque index was carried out on the research subjects in 3 times ie before brushing teeth, after brushing teeth according to the habits of the

Table 1 Average Silness and Loe plaque index score.

Silness and Loe plaque index scores		
Pretest	Posttest	Comparative Test
2.06	1.91	1.24

Table 2 Least Significant Difference test results

	Pre-test	Post-test	Comparative Test
Pretest	-	0.019*	0.632
Posttest	0.019*	-	0.048*
Comparative Test	0.632	0.048*	-

Description: (*) different meanings

research subjects, and after brushing teeth using an automatic wall mounted toothbrush.

The study used toothbrush as a treatment tool for the research subject. Toothbrush is the main tool used to clean teeth. Toothbrushes used in the study were conventional toothbrushes and automatic wall mounted toothbrushes. Conventional toothbrushes are the most widely used tools for cleaning teeth. The role of toothbrush in removing plaque has been proven through research conducted by Sharma et al.¹⁴ regarding clinical evaluation of five types of conventional toothbrushes to the effect of removing plaque.¹⁴ Other types of toothbrushes are electric toothbrushes made to facilitate the cleaning of plaque. Electric toothbrushes became popular in the early 1960s as an alternative tool for the manual toothbrush method. The advantage of this electric toothbrush is that it increases access to cleaning dental plaque in the interproximal and lingual parts of the tooth, does not require a specific tooth brushing technique, uses mild strength than a manual toothbrush, in some electric toothbrushes there is a timer that regulates the length of time brushing your teeth so that it can help patients brush their teeth according to the time needed.¹¹

Plaque index measurement in the study was carried out by recording using the Silness and Loe plaque index form which aimed to analyze the research data. The recording of the test is carried out immediately after the treatment is done on the sample. All samples were measured for plaque scores according to Silness and Loe by giving disclosing solution and matched with the dental plaque scoring table. Examination of the Silness and Loe plaque index test was carried out on all teeth that were owned by each sample. The Silness and Loe plaque index tests were examined on four sides of all teeth belonging to the study sample. The examined side is facial, lingual, mesial and distal.¹⁵

The results showed differences in the average Silness and Loe plaque index scores, namely in the treatment group in cerebral palsy children, where the pretest was 2.06, the comparison test was 1.91 and the posttest was 1.24. The results showed that the results of the pretest treatment group were lower than the results of the posttest treatment group. This shows that brushing teeth with an automatic wall mounted toothbrush has the best oral hygiene score.

The results of the Silness and Loe plaque index score analysis showed that the posttest group had the lowest Silness and Loe plaque index score average, thus supporting the use of automatic wall mounted toothbrushes that could reduce the Silness and Loe plaque index score. The decreased Silness and Loe plaque index score means that

oral hygiene conditions are increasing. So that an automatic wall mounted toothbrush can be a tool for CP children to maintain dental and oral hygiene. This automatic wall mounted toothbrush is one type of electric toothbrush that is made to facilitate children CP in cleaning up plaque accumulation and debris. Practical Oral Care for People With Cerebral Palsy in 2009 said that every CP person has problems with movement and posture. The limitations possessed by CP children and the difficulty of coordinating motor movements make this automatic wall mounted toothbrush can be a tool that facilitates CP children to brush their teeth to maintain their oral hygiene.¹⁶

Automatic wall mounted toothbrush as the initial model whose use has never been calibrated before can achieve its advantages as one type of electric toothbrush. Automatic wall mounted toothbrushes can improve access to cleaning dental plaque in the interproximal and lingual parts of the teeth, not requiring specific tooth brushing techniques so as to facilitate CP children in brushing their teeth.¹⁰ This automatic wall mounted toothbrush for CP children can facilitate CP children's work in coordinating motion because it has an automation system that is not owned by conventional toothbrushes. The automation system owned by this wall mounted automatic toothbrush has a system that facilitates the process of brushing teeth. Starting from giving toothpaste to the toothbrush automatically, the process of brushing teeth that automatically uses the timer / timer is adjusted to the ideal time of brushing teeth, and the gargling process to clean the child's oral cavity CP after brushing teeth. The automation system used in this wall mounted automatic toothbrush is made as a child CP tool to make it easier to maintain oral hygiene.

Conclusion

Based on the results of research that has been done, it can be concluded that the use of automatic wall mounted toothbrushes improves oral hygiene measured by the difference in Silness and Loe plaque index scores. Further research is needed regarding the selection of materials used in making tools, clinical trial studies or clinical trials on humans requiring a large number of research samples, experimental studies in clinical trials, in vivo, and in vitro will be more accurate if one study subject is observed by more than one observer, and more research is needed on the comparison of automatic wall mounted toothbrushes with toothbrushes recommended for children with

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Conflict of Interest

The authors report no conflict of interest.

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