

Comparison Between Fone's Method and Modified Bass Method of Toothbrushing for Children with Down Syndrome in West Java, Indonesia

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Abstract

Background and Aim: Down syndrome (DS) is a delayed physical and mental development caused by an abnormality in chromosome 21, resulting in the presence of three chromosomes (trisomy 21). Several methods of toothbrushing, such as the Scrub, Bass, Charters, Fone's, Roll, and Stillman's methods have been introduced. The aim of this study was to evaluate oral hygiene levels after toothbrushing with the Fone's and the modified Bass methods in children with DS.

Materials and Methods: This interventional study comprised 15 children (10 boys and 5 girls) aged 7-12 years (purposive sampling). Oral hygiene was assessed using the Simplified Oral Hygiene Index (OHI-S) method introduced by Greene and Vermillion. The results were analyzed using Student's t-test.

Results: Oral hygiene indices were 2.96 and 1.57 before and after using the Fone's method, respectively ($P=0.00$), and 2.55 and 2.16 before and after using the modified Bass method, respectively ($P=0.00$). A significantly increased level of oral hygiene was noted with the Fone's method (1.39) when compared to the modified Bass method (0.39) of toothbrushing ($P=0.00$).

Conclusion: Both the Fone's and the modified Bass methods of toothbrushing can improve the oral hygiene of children with DS, with the Fone's method appearing to be more effective than the modified Bass method.

Key Words: Down Syndrome, Toothbrushing, Oral Hygiene

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Introduction

Down syndrome (DS) is the most commonly found autosomal chromosomal abnormality in humans. It is characterized by an abnormality of chromosome 21, wherein a failure in the division of the chromosome leads to an unbalanced translocation, resulting in cells with an extra chromosome (trisomy) or additional genetic material. Approximately 20% of children with DS are born from mothers aged more than 35 years. DS malformations are

caused by trisomy of chromosome 21 (95%), translocation (4%) or mosaicism (2%) [1,2].

The reasons for the occurrence of DS have remained unknown. Failure in cell splitting, which occurs at the time of conception, is not related to the activities of the mother during pregnancy. DS with trisomy 21 may occur during meiosis, when the gamete is formed, and during early mitosis (zygote development). The development of the primary oocyte is stopped during the prophase of meiosis I until ovulation;

the oocyte experiences nondisjunction during this period. In DS, the ovum might present with autosome 21 during meiosis I phase and result in the formation of a zygote with trisomy 21 when ovulated by normal spermatozoa [3,4].

The main symptom of DS is the presence of intellectual disabilities ranging from 50-70, and sometimes 90, on the Binet and Wechsler scale [5]. An additional chromosome 21 is a characteristic finding in DS and accounts for the similarities in the appearance of people affected by this condition. Mental retardation affects the level of intelligence, resulting in delayed motor development and speech problems [5].

Oral care in children with DS should encompass not only emergency treatments, such as tooth extraction, but also global rehabilitation to improve and maintain the functions of the teeth. It is important to focus on preventive treatments in individuals with DS. It is difficult to communicate with these children because of their diminished ability to receive and follow instructions; therefore, the assistance of parents or other care personnel is required, especially for infants and very young children [6-8].

The preventive measures that can be taken at home include maintenance of oral hygiene and diet control. Oral hygiene can be maintained by regular toothbrushing [9,10]. The two factors necessary to achieve effective results are the correct method of toothbrushing and the willingness of the patient to maintain oral hygiene. Different methods of toothbrushing generally used include the Scrub, Bass, Charters, Fone's, Roll, and Stillman's methods. Different toothbrushing methods have been used in previous studies to make it easier for children with DS to clean their teeth and improve their oral hygiene [11].

Wambier et al [12] demonstrated a significant decrease in dental plaque in preschool children after using the Fone's method of toothbrushing. In another study, Wainwright and Sheiham [13] reported that the most recommended method of toothbrushing was the modified Bass method followed by the Fone's and the Scrub methods. Alanazi et al [14] stated that the modified Bass method combined with a distal oblique method of holding the toothbrush is significantly

effective in eliminating dental plaque. Similarly, Smutkeeree et al [15] recommended the use of the modified Bass method to effectively decrease plaque and gingival indices in children aged 10-12 years with visual impairment.

The aim of the present study was to evaluate the oral hygiene after using the Fone's and the modified Bass methods in children with DS.

Materials and Methods

This interventional study involved children from Persatuan Orang Tua Anak Dengan Down Syndrome, who visited the Pediatric Dentistry Clinic at the Faculty of Dentistry, Universitas Padjadjaran, Indonesia, during April-May 2017. Of the 20 DS patients aged 7-12 years, 15 fulfilled the inclusion criteria. Informed consent was obtained from the parents or caretakers of the participants. The ethical clearance was approved by the Health Research Ethics Committee of the Medical Faculty, Universitas Padjadjaran, Indonesia. The Fone's and the modified Bass methods of toothbrushing were used. The patients were first educated about the method followed by examination of oral hygiene; subsequently, the patients were instructed to brush their teeth using the method two times a day for one week. During the one-week period, the researcher would check whether the patients were following the instructions appropriately on a daily basis. After one week, the patients visited the clinic and were requested to brush their teeth using the Fone's method. The plaque score was examined using the Simplified Oral Hygiene Index (OHI-S) method introduced by Greene and Vermillion. The week that followed thereafter was the wash-out period. This was succeeded by a week of toothbrushing using the modified Bass method.

Statistical analysis:

Paired t-test was used to compare the oral hygiene levels before and after toothbrushing using the two methods, whereas unpaired t-test was used to compare the oral hygiene levels between the two toothbrushing methods.

Results

Oral hygiene levels in the 15 patients using the Fone's method before and after toothbrushing

were 2.96 and 1.57, respectively (standard deviation (SD)=0.55, P=0.00; Table 1), indicating a significant improvement in oral hygiene after using this method of toothbrushing.

Table 2 shows the increase in oral hygiene levels after using the modified Bass method before (2.55) and after (2.16) toothbrushing

(SD=0.28, P=0.00).

As shown in Table 3, a significant increase in oral hygiene levels was noted among children who used the Fone's method when compared to those who used the modified Bass method (1.39 vs. 0.39, P=0.00).

Table 1. Oral hygiene levels after using the Fone's toothbrushing method

| M-F | N | Average OHI-S | SD | t-statistic | P-value |
|--------|----|---------------|------|-------------|---------|
| Before | 15 | 2.96 | | | |
| | | | 0.55 | 7.25 | 0.00* |
| After | 15 | 1.57 | | | |

M-F=Fone's method, N=number of samples, OHI-S=Simplified Oral Hygiene Index, SD=standard deviation;

*P<0.05 is considered significant

Table 2. Oral hygiene levels after using the modified Bass toothbrushing method

| M-MB | N | Average OHI-S | SD | t-statistic | P-value |
|--------|----|---------------|------|-------------|---------|
| Before | 15 | 2.55 | | | |
| | | | 0.28 | 2.86 | 0.00* |
| After | 15 | 2.16 | | | |

M-MB=modified Bass method, N=number of samples, OHI-S=Simplified Oral Hygiene Index, SD=standard deviation;

*P<0.05 is considered significant

Table 3. Comparison of oral hygiene levels after using the Fone's and the modified Bass methods

| Method | N | | Mean OHI-S | Difference in mean OHI-S | SD | t-statistic | P-value |
|--------|----|--------|------------|--------------------------|------|-------------|---------|
| M-F | 15 | Before | 2.96 | | | | |
| | | After | 1.57 | 1.39 | 0.55 | | |
| | | | | | | 6.27 | 0.00* |
| M-MB | 15 | Before | 2.55 | | | | |
| | | After | 2.16 | 0.39 | 0.28 | | |

M-F=Fone's method, M-MB=modified Bass method, N=number of samples, OHI-S=Simplified Oral Hygiene Index, SD=standard deviation; *P<0.05 is considered significant

Discussion

The most important and commonly found problems in children with DS include caries and gingivitis. It is difficult to maintain oral hygiene in these individuals owing to factors such as the mouth breathing habit, abnormal occlusion, cariogenic diet, and side effects of drugs. The orthodontic management of children with DS includes both emergency treatments as well as global rehabilitation. It is very important to prevent the development of oral diseases in these children in order to maintain their oral health. Appropriate toothbrushing and mechanical actions are the most practical and effective means to maintain adequate oral health. Kohli et al [9] found that, in spite of difficulties in treating handicapped children, owing to diminished levels of intelligence and hand skills, the management of oral conditions of these children was almost similar to that of normal children [16].

As observed in Table 1, the Fone's method was found to be more effective in improving the oral hygiene in children with DS. This finding is similar to that reported in a study by Joybell et al [17] who compared the Fone's and the modified Bass methods in children with visual impairment using audio-tactile performance. Both methods significantly improved the oral hygiene of these children. The Fone's method demonstrated a clear benefit in decreasing gingivitis; in addition, the method was easy to grasp and perform. Harnacke et al [18] reported that the Fone's method was easy to understand and remember, thereby making it easier for the children to adapt to.

In the present study, the modified Bass method also appeared to improve the oral hygiene among DS children (Table 2). A study by Surya et al [19] revealed that the Bass method was effective in decreasing the plaque score of 5th-grade students of Semen Padang Elementary School when compared to the Charter method. In addition, the author discussed how the Bass method was recommended by The Indonesian Ministry of Health because it could help in cleansing the interproximal areas and provide a massaging action on the gums. The limitations of this method included the fact that it needed

repeated exercise and involved complicated movements [19].

The Fone's method was found to be significantly more effective in improving oral hygiene when compared to the modified Bass method in the current study (Table 3). Joybell et al [17] reported that the Fone's method was most commonly used by children and patients with special needs because of the following reasons: effective circular movements are involved, it is simple to perform, it causes no irritation to the gums, and it was said to be in accordance with the oral condition of the users. Therefore, this method has been proven to be able to increase oral hygiene indices.

A child with DS is not able to maintain his/her oral health. Thus, the parents should realize the importance of oral health and help in performing the preventive activities, which include cleaning the child's teeth, monitoring the daily diet, and visiting the dentist regularly [20].

Conclusion

The findings of the present study demonstrated that both the Fone's and the modified Bass methods of toothbrushing could improve the oral hygiene of children with DS. The Fone's method was more effective than the modified Bass method in improving the oral hygiene of these children.

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