Dental and Oral Care Treatment Needs in Children with Down Syndrome in Surabaya

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Submission date: 13-Apr-2023 11:26AM (UTC+0800)
Submission ID: 2063133666
File name: 14656-Article_Text-28448-1-10-20210401.pdf (923.56K)
Word count: 4772
Character count: 26491

Dental and Oral Care Treatment Needs in Children with Down Syndrome in Surabaya

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Abstract

Objective: Aims of this study was to observe dental and oral care treatment needs of Down Syndrome children who are members of the Parents' Association of Children with Down Syndrome (POTADS) in Surabaya. **Material and Methods:** This study used secondary data from dental and oral examination records of total sample 34 Down Syndrome children aged 5-17 years who attended community service program "SPECIAL CHILDREN DENTAL VISIT -1" from August to October 2017. **Results:** Only few samples showed good oral hygiene though most of them brushed their teeth twice a day which likely related to physical and mental limitations. Most samples had cariogenic dietary habits with def-t/DMF-T score were below 10. Malocclusion founded can be worsen by oral bad habits which has existed in most samples. **Conclusion:** From this study it can be concluded that the most indicative treatment for Down Syndrome children are restorations and extractions.Good collaboration between parents and caregivers is needed to prevent more severe oral health problems which need more complex dental treatment. Children with Down Syndrome are entitled to the opportunity to develop and get special services, including in terms of oral health. With good oral health, the quality of life of Down Syndrome children can improve.

Keywords: *Down Syndrome, dental and oral care needs, quality of life*

Introduction

Indonesia Law No.4 of 2017 by State Minister for Women Empowerment and Child Protection Republic Of Indonesia concerning Special Protection For Children With Disabilities, define children with disabilities are whom with physical, intellectual, mental and / or sensory limitations for a long period of time who, when integrated with the environment, may experience obstacles and difficulties to participate fully and effectively with other children based on equal rights[1]. The Indonesia's Basic Health Research (RISKESDAS) in 2018 reported that 3.3% of children aged 5-17 years had disabilities[2]. For the group of children aged 24 - 59 months, the RISKESDAS in 2013 reported the prevalence of disabilities including special needs condition of Down Syndrome was 0.13% which increased from 2010 prevalence of 0.12% and reached 0.21% which stated on 2018 RISKESDAS data[3,4]. According to World Health Organization (WHO), the estimated incidence of Down Syndrome is between 1 in 1,000 to 1 in 1,100 births and currently reach 8 million around the world. It is estimated that about 3,000 to 5,000 children are born with Down Syndrome every year[5]. Data from the Down Syndrome Association of Indonesia, stated that almost 300,000 cases reported in the country[6].

Down Syndrome which earlier referred to as mongolism, was first described by Langdon Down, physician from England in 1866. Down Syndrome is a condition of abnormality of chromosome 21 or also known as trisomy 21. Down Syndrome is 95% caused by failure in cell division or is called non-disjunction due to risk factors like viruses / infections, radiation, aging of ovum, thyroid function disorders, the age of pregnant women over 35 years. The clinical appearance of a Down Syndrome sufferer can vary from unseen and minimal appearance to characteristic features. Some cardinal sign of physical characteristics included muscle hypotonia and hyperflexiblity, short stature with

a relatively smaller head with flat facial profile, oblique eyes with epicanthal folds, dysplastic ear, simian crease. Characteristics of orofacial structures include middle facial hypoplasia, with a relatively small size of nose bridge, facial bones and upper jaw; and a high and narrow palate. Hypoplasia of the middle face causes relative macroglossia where the tongue has normal size but smaller jaw size which causes difficulty in speaking and chewing. Malocclusion is a common condition. Children with Down Syndrome are prone to suffer from periodontitis, whereas for dental caries incidence is very low. With more than 50% of them can be caries free was especially remarkable since oral hygiene was more often neglected[4,7].

People with Down Syndrome also have mental retardation characteristics which included in mild or moderate based on IQ classification. They may have cardiovascular disorders, hematopoietic problems, visual and hearing impairments. Developmental delays, such as in speech and language, are common. These unique characteristics of children with Down Syndrome have impacts on the service needs they obtain. The condition cause limitations that result in independence and require prolonged support from environment[7,8]. Children with special needs are entitled to special services aimed to protect and fulfill the rights so that they can grow and develop and participate in society[1]. Early professional treatment by dentists, especially pediatric dentists, and daily oral care at home by parents and caregivers, enabling Down Syndrome children to have not only a healthy mouth, but on their quality of life as well[8].

In Surabaya, parents of children with Down Syndrome form POTADS, Parents' Association of Children with Down Syndrome. The members are from East Java Province which routine gather and manage cooperation with supporting organization/institution like IDGAI JATIM (Indonesia pediatric dentist association, East Java branch) and Pediatric Dentistry Department, Faculty of Dental Medicine Universitas Airlangga. From this study through community service activity "SPECIAL CHILDREN DENTAL VISIT-1", we observe the dental and oral health condition of Down Syndrome children who are members of POTADS in Surabaya. From the result we hope that hence forward we can map the general dental and oral care treatment needs in children with down syndrome.

Material and Method

Study Design and Sample

This observational study involved samples of 34 children with Down Syndrome aged 5-17 years, members of POTADS who attended to Specialist Clinic of Pediatric Dentistry, Dental Hospital Universitas Airlangga Surabaya between August and October 2017, whom parents or guardians were unable to give consent form were excluded from the study.

Data Collection

All samples had received caries preventive program including oral examination, oral hygiene instruction and motivation, prophylaxis and topical fluoride application which were applied by undergraduate pediatric dentistry specialist students (chief residents) under the supervision of instructor, specialist staff of Pediatric Dentistry Department, Faculty of Dental Medicine Universitas Airlangga.

The study was conducted by analyzing secondary data from examination results on medical records which include the results of anamnesis on parents and the results of objective examinations on samples. Anamnesis includes medical history, eating habits, and habits of brushing teeth, while the objective examination includes examination of soft and hard tissue, namely oral hygiene, caries, and malocclusion. Analysis is also carried out on treatment needs based on the results of the examination and supporting OPG.

Data Analysis

Microsoft Excel (version 2007) and Statistical Package for the Social Sciences (SPSS) statistical software (version 16) was used for data entry and descriptive analysis, respectively.

Ethical Aspects

This study was approved by the Committee of Ethics Faculty of Dental Medicine Universitas Airlangga. Before starting the study, all parents or guardians were informed about the aim, nature, and potential distresses and benefits of the study. Then, informed consent was obtained for each sample.

Result

From 34 samples of children aged 5 and 17 years who participated in the study, most of the children were girls (58.8%), and mean age was 7. Of all samples, 58.82% had a history of systemic diseases such as heart disease, allergies, measles, chicken pox, diarrhea and pneumonia and 50% of samples had been hospitalized. From oral hygiene examination by checking their debris and calculus using OHI-S index, appears that only 14.71% of the sample had good oral hygiene and most of the samples showed poor oral hygiene (41.18%). The results of the examination showed malocclusions distribution in samples as shown in graph 1. From graph 1, most samples (23.53%) had Class I Angle malocclusions, then anterior crossbite and crowding. About 10% of samples had Class III Angle malocclusions and anterior open bite condition. None of the samples showed Class II Angle malocclusion.

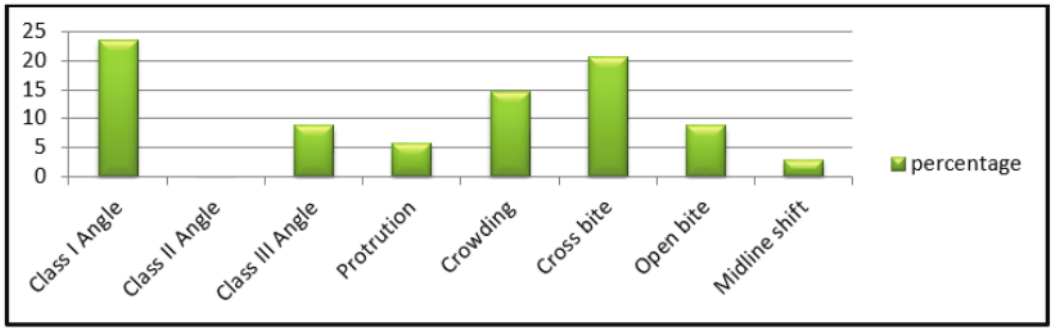

Figure 1. Distribution of samples based on malocclusion conditions.

Caries experience of samples was measured with def-t and DMF-T score ranged from 0 to 20, with 14.71% of the samples were caries-free and only 1 sample with the def-t / DMF-T score reach 20 (graph 2). Most of samples (58.82%) had def-t and DMF-T score below 10.

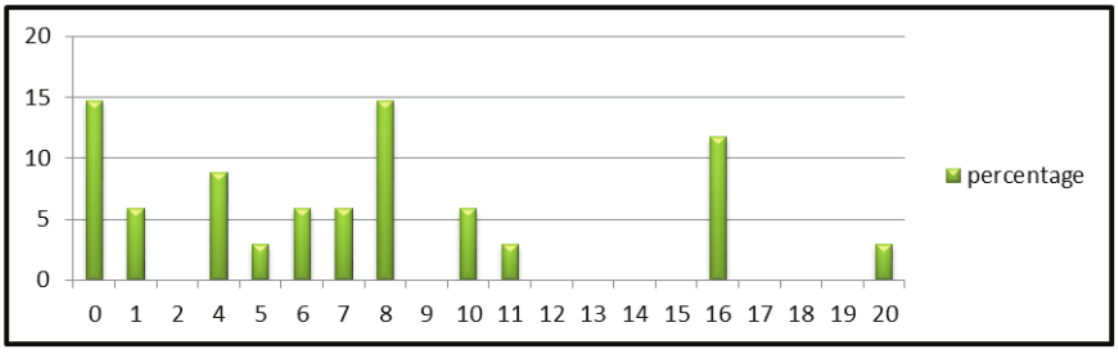

Figure 2. Distribution of samples based on def-t / DMF-t numbers.

Caries risk factor were assessed from eating habits and habits of brushing teeth in a day. From graph 3 showed that nearly 40% of the sample had habit of eating sweets, biscuits and cakes while they also have big appetite. All three are highly cariogenic foods, especially if they are not matched by efforts to maintain oral hygiene such as brushing teeth regularly and gargling after every meal.

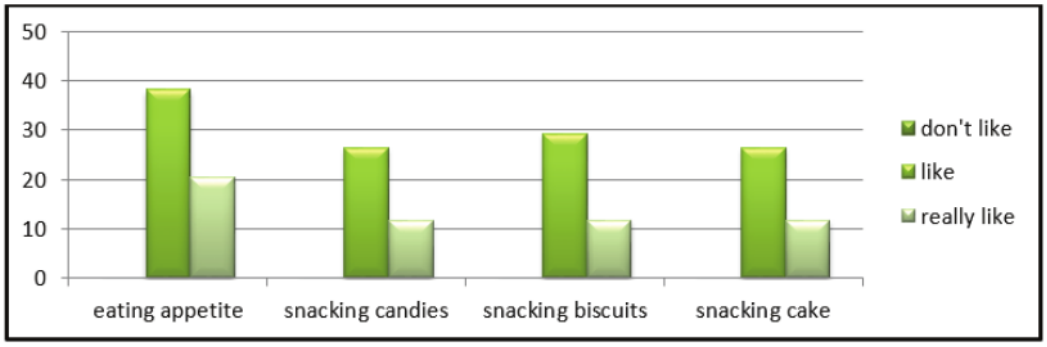

Figure 3. Distribution of samples based on caries risk factor: eating habits.

As shown on graph 4, most of the samples (55.88%) had the habit of brushing their teeth twice a day. But there are still a number of samples that only brush teeth once a day, even didn't have the habit of brushing their teeth every day. The graph also showed that few samples had brushing their teeth more in three or four times a day.

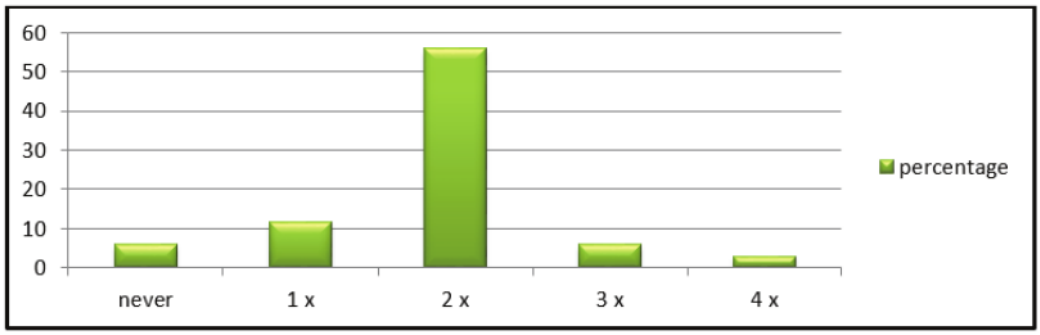

Figure 4. Distribution of samples based on caries risk factor: daily brushing habits.

From the graph 5, showed that the most indicated dental treatment for sample in this study was restoration in 61,76% and then extraction 55.88% and 38.23% from the total sample needed fissure sealants as caries prevention. Other dental treatments needed were scaling, space maintainer/partial denture and pulp treatment for more than 10% of samples, orthodontic treatment for 8,82% of samples, Preventive Resin Restoration and Stainless Steel Crown for about almost 6% of samples.

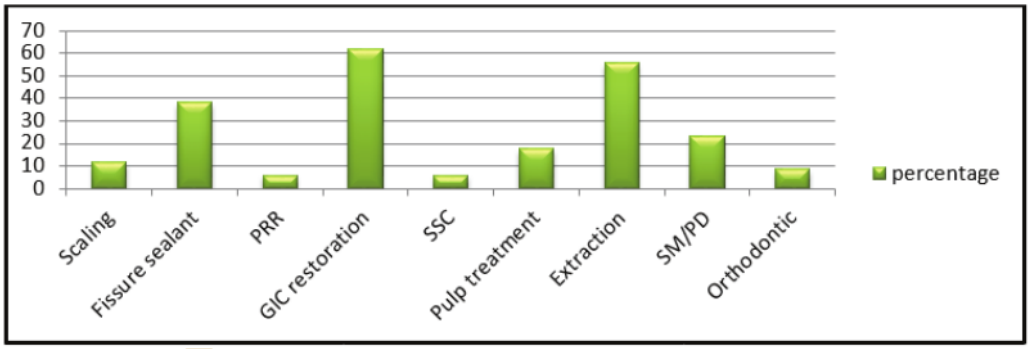

Figure 5. Distribution of samples based on the type of dental treatment indication.

Discussion

In this three months community service activity program "SPECIAL CHILDREN DENTAL VISIT -1" by Pediatric Dentistry Department, Faculty of Dental Medicine Universitas Airlangga in Dental Hospital Universitas Airlangga for children of POTADS Surabaya branch members, though most samples were girl, Down Syndrome prevalence in boys were reported higher (0.08%) than in girls (0.06%) which about 4% of Down Syndrome case were inherited from parents with the mother as carrier has bigger risk (10-15%) than the father (3%)[4]. From Ariani (2014) which reported each year addition of Down Syndrome new case confirmed from four cytogenetic laboratory in Indonesia, also emphasized more awareness about the importance of genetics and genomic medicine future implementation[6]. Cardiac disorders are common in 40-45% Down syndrome patient which shown in this study samples. People with Down Syndrome are at risk of developing valve dysfunction that leads to congestive heart failure, even if they have no known cardiac disease. Dentist must consult the patient's physician in the need for antibiotic prophylaxis[4,8]. From anamnesis result also showed that half of this study samples had been hospitalized. Ministry of Health Republic of Indonesia reported that from 2015 to 2017 there were about total 1000 Down Syndrome inpatient cases and also an increasing number of new Down Syndrome outpatient cases in more than 2000 hospitals in Indonesia[4].

Almost all samples of this study (88.23%) were cooperative on dental care. It can be seen from only a small sample were not able to take OPG after being examined oral and dental condition by the operator chief residents of Pediatric Dentistry Specialist. The cooperativeness of special need children as dental patient may vary depends on many factors but behavior management is not usually a problem in people with Down syndrome because they tend to be warm and well behave, only some can be stubborn or uncooperative[7,8]. From AAPD Reference Manual Of Pediatric Dentistry in Prescribing Dental Radiographs for Infants, Children, Adolescents, and Individuals with Special Health Care Needs, radiographic screening for the purpose of detecting disease before clinical examination should not be performed and should be taken only when there is an expectation that the diagnostic yield will affect patient care. It also mentioned that if radiographs of diagnostic quality are unobtainable, the dentist should confer with the parent to determine appropriate management techniques (e.g., preventive/restorative interventions, advanced behavior guidance modalities, deferral, referral), giving consideration to the relative risks and benefits of the various treatment options for the patient [9]. OPG is recommended for patient with Down Syndrome because it is more easily accepted than periapical and/or occlusal radiographic photographs which must be taken as well if necessary for the diagnosis[7,10].

In general, treating Down Syndrome patient just need a little extra time and attention to make it more acceptable. It is very important to set comfortable atmosphere for dental visit which can be done by scheduling appointment in the morning and shorter waiting time if possible[7,8]. In this community program, the appointment was conducted in early office hours and the clinic had also made an arrangement for other patients treatment schedule. The Pediatric Dentist Specialist Clinic of Dental Hospital Universitas Airlangga has special treatment room which particularly use for treating special need patient. In treating Down Syndrome patient, it is necessary to minimize disturbances in the form of both sound and light though music can be played during dental care so that Down Syndrome patient feel more relax. It is useful to note patient's preferences and other unique details that will facilitate treatment, such as music, comfort items, and flavor choices. People with Down Syndrome also have developmental delays which are generally in the form of speech difficulties, hearing loss and vision impairment which cause obstacles in communication. This condition is absolutely known prior to dental care so that the dentist and team can anticipate, such as maintaining eye contact, minimizing the noise of saliva ejector/suction machine and television, not using a mask when speaking in a soft tone so that the voice is clear and lip movements are readable. Through the pre-appointment, the operator contact parents/caregiver to gain information needed about special condition of each patient prior to dental visit for the dentist and team to be well prepared in establishing good communication. By establishing a good communication, will decrease the anxiety of the patient, gain trust and be able to motivate them to take a good care of their oral health[7,8,11]. As in this community program, at the end of the treatment a reward was given which can motivate and increase

patient cooperation.

Only 14.71% of the sample had good oral hygiene shown from the tooth debris and calculus (OHI-S index) and almost 12% of the samples need scaling prior to other dental treatment needed. People with Down Syndrome usually have poor oral hygiene, which characterized by inflammation of the gingival margins, acute and subacute necrotizing gingivitis, and advanced chronic periodontitis with abundant neither supra-nor subgingival calculus and material alba[7]. The prevalence of periodontal disease in patients with Down Syndrome ranges from 50-90% with increased severity compared to normal children of the same age and other mental disabilities[12]. But poor oral hygiene may not the only explanation of severe and generalized periodontal destruction found in Down Syndrome patients. This condition may be due to tissue anoxia of narrow arteries and peripheral capillaries and also associated with compromised imune system. There is a tendency to increase sensitivity to periodontal disease due to functional defects of cellular PMN and monocyte found in Down Syndrome children with lymphopenia[5,7,13]. As it may be an early sign of leukaemia, dentist should be alert to the presence of persistent lesions and spontaneous gingival bleeding. Down Syndrome patients have up to 20 times higher risk of developing leukaemia when compared to the general population[14]. It is important to treat acute necrotizing ulcerative gingivitis and other infections aggressively[8]. The severity of periodontal disease which tends to increase with age, if left unchecked can lead to the formation of pockets and bone loss in young children, causing teeth must be extracted[7].

Development of periodontal disease in people with Down Syndrome can also be caused by local disorders such as poor occlusal correlation, high frenum insertion, early mucogingival problems and advanced tongue position. Management of malocclusion must receive attention when treating periodontal condition[13]. High crossbite case as shown in this study have also been reported by previous studies, as well as cases of open bite. Some of the causes of malocclusion in people with Down Syndrome are due to the less developed maxilla, the prognathic of the mandible and the hypotension of the lips and cheeks. Macroglossia and tongue thrusting habits observed are important to correct by practicing the right tongue position when swallowing[7,14]. Another bad habit found in Down Syndrome patients is bruxism which associated to chronic anxiety, underdeveloped nervous system, malocclusion and TMJ dysfunction creates smoother occlusal surfaces enabling self cleansing but also lead to problems related to jaw reposition treatment need[14]. Malocclusion in Down Syndrome children may and can be successfully treated, depending on the severity of the malocclusion and influenced mental retardation conditions as well as the ability of cooperation between parents and caregivers related to the ability to maintain oral hygiene and control the use and care of orthodontic appliance[7]. In addition to periodontal treatment, Down Syndrome patients must also receive attention and management of obstructive sleep apnea and upper respiratory tract infections which can cause mouth breathing habits[7,13].

Down's syndrome children are resistance to dental caries and about half of them are caries free. As shown in this study, most of samples (58.82%) had def-t and DMF-T score below 10. Down Syndrome patient with caries development show far less number of cavities than would be expected in a normal child which can be due to dental anomalies[15]. Dental anomalies in primary and permanent teeth are very common, and has incidence five times greater in people with Down Syndrome when compared to general population. Anomalies in the number (hypodontia), size (microdontic teeth) and morphology (shallower teeth fissures) and the timing of their eruption. Delayed tooth eruption may occur as long as 2–3 years in an unusual order[7,14]. Another theory states that the results of the salivary electrolytes analysis showed that in Down Syndrome patient, sodium chloride and bicarbonate concentrations as well as pH are high although saliva flow was quite low and tend to be xerostomia. In people with Down Syndrome, caries develops can due to consumption of medicinal syrup containing sugar and cariogenic foods with a soft consistency from difficulty chewing due to hypotonus masticatory muscles which also causes a lack of self-cleansing ability[7].

Caries treatment need for this study samples were restoration using Glass Ionomer Cement (61,76%) then Preventive Resin Restoration and Stainless Steell Crown for about almost 6% of the sample, pulp treatment for more than 10% samples, and extraction about 55.88%. It is critical to maintain the primary dentition as long as

possible with the delayed emergence of the permanent teeth and the high number of missing teeth[15]. Poor periodontal tissue health conditions in people with Down Syndrome can cause permanent teeth to be removed in their teens which had been reported of more cases in loss of lower anterior permanent teeth before 8 years of age[7,14]. Routine psychological (Tell-Show-Do) intervention along with visual distraction using video eyewear and use of CDS-IS (computerized delivery system-intrasulcular) system was reported as effective behavior management technique for anesthetic delivery during invasive dental treatment[16]. But since 40-50% of people with Down Syndrome in general have a condition of the heart disease as risk factor for extraction, then the treatment must be under general anesthesia[7]. The use of general anesthesia is indicated for cases of more complex dental problems, which involve extensive dental treatment. Preventive, restorative and surgical treatment can be performed and concluded in a single appointment[10]. Furthermore, the indication of extraction followed by space maintainer appliance, partial denture or orthodontic treatment, though Down Syndrome is not a barrier to orthodontic care but certainly requires a much greater effort to be successfully carried out. Orthodontic treatment should be carefully considered in people with Down syndrome, some may benefit, while others may not. The possibilities and success of ortohodonrictreatment in Down Syndrome patients are limited by the ability and skills needed to ensure compliance in oral hygiene and in the use of removable or fixed appliances[7,8].

In this study 17,64% of samples did not brush teeth twice a day. Some people with Down syndrome can brush and floss independently, but many Down Syndrome children have physical and mental limitations that cause difficulties in holding and moving a toothbrush whose need help. Specific recommendations on brushing methods or modification of the shape of the toothbrush handle or the use of power toothbrush is sometimes needed to help them to hold their own toothbrushes and dentist must involve patients in hands-on demonstrations of brushing and flossing. However, the role of parents and caregivers is still very necessary to ensure that all parts of the teeth have been brushed, which can be helped by prior applicating the disclosing agent. Dentist must assume parents or caregivers do not know the right position in helping children with special needs brush their teeth so it is important for dentist demonstrate brushing teeth by sitting or standing positions. In addition to the importance of frequency of brushing teeth in a day, the right time to brush teeth, the use of fluoride toothpaste and the habit of gargling after eating are also important factor regarding maintaining oral health to prevent caries. Antimicrobial mouthwash containing chlorhexidine twice a day is recommended for people with Down Syndrome who able to gargle, or either using a spray bottle or in gel form applied on toothbrush which equally efficacious for person who has swallowing difficulties or one who cannot expectorate[7,8,17].

Down Syndrome children first dental visit should be at age 12-18 month to monitor tooth development and eruptions. Caries preventive must be programmed intensively to avoid later oral health problem which include oral hygiene instruction and motivation, dietary counseling and control, topical fluoride application and fissure sealant[17]. Method about how to maintain the dental health of children with special needs is very important to be taught to parents and caregivers early on and it is important to be repeated adjusted to the child's growth and development. Oral Health Instruction should ideally be carried out on the first visit to the dentist and oral hygiene control is carried out at each regular visit every 3 months or more often for some children[7,15]. Using leaflet or module print or non print as media that can be re-learned at home by parents or caregivers still an option. In general, visual-spatial processing and perception of people with Down Syndrome viewed as strength, therefore advice ideally given using media picture or diagram and models[17]. In this digital era, Dental Health Education using audiovisual media with or without interactive game can gain interest from children too.

Increased knowledge of parents and caregivers of children with Down Syndrome is expected to be able to build awareness and increase collaboration with dentists, especially pediatric dentistry specialist, enabling Down Syndrome children to have maintained oral health and improve their quality of life. Dentist, especially pediatric dentist specialists have important role in improving the quality of life for people with Down Syndrome. Besides having knowledge and exceptional skills, it requires willingness, patience, compassion, and motivation to

overcome the barriers faced in treating children with special need condition like in Down Syndrome[11]. Pediatric dentist should always consider general health when planning the dental treatment of patients with Down syndrome, in order to achieve a holistic and interdisciplinary approach with following health professionals included: pediatricians, family medicine physicians, internists, speech-language pathologist, physical therapist, occupational therapist and special education teachers whom each of them play important role[14,16].

Conclusion

From this study it can be concluded that the most indicative treatment for Down Syndrome children is restoration and extraction which can be caused by poor oral hygiene, possibly related to physical and mental limitations in brushing teeth habit, as well as eating habits of cariogenic foods and oral habits that can worsen existing malocclusions. Besides the physical and mental limitations that require dentists to put more effort into the management of children's behavior during treatment, caries preventive such as fissure sealants and topical fluoride applications as well as restorative are very important to avoid indications of extraction due to dental conditions that cannot be maintained.

Extra effort also absolutely necessary for parents and caregivers to work together with dentists, especially pediatric dentists in the treatment of Down Syndrome children to prevent more severe dental and oral health problems. Children with Down Syndrome are entitled to the opportunity to develop and obtain special services, including in terms of oral health. From this study, it is also proven that Down Syndrome children can be free of caries which can be a motivation for Down Syndrome children and their parents and caregivers.

Financial Support: FKG UNAIR Community Service Grant Year 2017

Conflict of Interest: The authors declare no conflicts of interest.

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