

## Caries Experience in People with Down Syndrome Aged 14 Years and Older in SLB C Jakarta

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### Abstract

Down syndrome is a genetic disorder caused by trisomy of chromosome 21. People with Down syndrome have a variety of oral characteristics, as well as oral problem such as caries and periodontal disease. The aim of this study was to examine the frequency distribution of caries in people with Down syndrome, aged 14 years and older, in SLB C Jakarta. Subjects of this study are from 43 SLB C in Jakarta. This was a descriptive, cross sectional study of 174 people with Down syndrome, aged 14 years and older chosen using a purposive sampling technique. Clinical caries examinations were performed using DMF-T index. The DMF-T Index was 5.90 among the total subject population with a caries prevalence of 84.48%. Children with Down syndrome, aged 14 years and older, in SLB C Jakarta have a high prevalence of caries, with a DMF-T index scored of 5.90.

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### Introduction

Down syndrome is a genetic disorder caused by trisomy of chromosome 21, bringing the total number of chromosomes to 47. Down syndrome is associated with physical and mental underdevelopment and was first recognized in 1866 by Dr. John Langdon Down. The incidence of Down syndrome in the world is about 1:700 live births.<sup>1</sup> According to the Indonesia Health Profile, the prevalence of Down syndrome is 0.12% (Ministry of Health Republic of Indonesia 2010).<sup>2</sup>

Individuals with Down syndrome exhibit disordered mental development and vary in appearance and cognitive abilities. Some facial characteristics commonly associated with Down Syndrome include a round and flat face, epicanthal folds in the inner end of the eyes, and flat and wide nose bridges.<sup>3</sup> The most common oral features are mouth breathing, open bite, macroglossia, fissured lips and tongue, angular cheilitis, late tooth eruption,

loss and malformation of teeth, microdontia, malocclusion, bruxism, and a low caries incidence.<sup>4</sup>

Caries involves chronic loss of tooth minerals due to acid production by bacteria in dental plaque, causing damage to the enamel.<sup>5</sup> Specific bacterial flora such as *Streptococcus mutans* produce acid by carbohydrate fermentation so that the pH of the oral cavity drops to less than 5.0, resulting in tooth demineralization and initiation of caries.<sup>6</sup>

Caries are highly prevalent in Indonesia. Based on the results of the Basic Health Research 2013, DMF-T and def-t indexes which are assessments of oral health, Indonesian society scored 4.6, and 1.4 for school-aged children younger than 12 years old. The literature on children with Down syndrome, however, seems to show a different picture. Research on the prevalence of caries in children with Down syndrome has produced variable results. In Portugal, the caries prevalence in children with Down syndrome was only 28%.<sup>7</sup> However, another study out of Riyadh, Saudi Arabia found a caries prevalence of 89% in children with Down syndrome.<sup>8</sup>

So far, there is no definitive data on the prevalence of oral and dental health problems, especially pertaining to caries in people with

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Down syndrome in Jakarta. In this population, permanent tooth eruption can be delayed for up to two years, so that permanent dental eruption is usually completed by age 14.<sup>9</sup> Considering this, we were interested in investigating the caries experience in people with Down syndrome, aged 14 years and older, in Jakarta, Indonesia.

### Material and Methods

This descriptive research used a cross sectional data retrieval method involving intraoral examinations. Research subjects were from 43 SLB C in West Jakarta, East Jakarta, North Jakarta, South Jakarta, and Central Jakarta. The inclusion criteria were Down syndrome diagnosis established by a physician, aged 14 years and older, permanent dentition, and ability to cooperate with clinical examinations. We excluded people who had undergone orthodontic treatment. The caries examination was performed by clinical examination using the DMF-T index of the ratio scale by adding *decay* (D), meaning

permanent teeth with caries that still can be restored, *missing* (M), meaning permanent teeth lost by caries, and *filling* (F), meaning permanent teeth which have caries and have been restored well.<sup>6</sup> This research was conducted in August - October 2017.

### Results

The caries examination was performed clinically by screening all teeth except molar 3 using the DMF-T index. We examined 174 people with Down syndrome, aged 14 to 53 years.

Table 1 shows teeth with caries, teeth extracted due to caries, and teeth that were restored due to caries, in people with Down syndrome in SLB C Jakarta by age. The highest DMF-T found 18, at the age of 32 years. The highest D was 18 at age 39, the highest component M was 1 among 33- and 41-year-olds, and the highest F was 0.63 among 22-year olds. The lowest DMF-T was 2 among 26 year-olds.

Age (years)	n	D	M	F	DMF-T
14	21	4.38	0	0	4.38
15	25	5.2	0.08	0.12	5.40
16	29	6.25	0.07	0.29	6.61
17	24	4.92	0.04	0.08	5.04
18	14	8.93	0	0	8.93
19	16	5.13	0	0.13	5.25
20	6	5.5	0.17	0	5.67
21	9	4.44	0.22	0	4.67
22	8	5.13	0	0.63	5.75
23	5	5.4	0.6	0.2	6.2
24	1	4	0	0	4
25	2	3	0	0	3
26	2	2	0	0	2
29	1	5	0	0	5
32	3	10.67	0	0	10.67
33	2	6.5	1	0	7.5
37	1	13	0	0	13
38	1	6	0	0	6
39	1	18	0	0	18
41	2	7	1	0	8
53	1	6	0	0	6

n : subjects; D : caries teeth M : missing teeth due to caries; F : restored teeth, previously affected by caries ; DMF-T : caries experience

**Table 1.** Decay (D), Missing (M), and Filled (F) data obtained from the DMF-T Index, administered to 174 people Down syndrome, aged 14 years and older, in SLB C Jakarta, by age.

Table 2 presents the mean DMF-T indices of our study population. The results show a mean DMF-T of 5.90 with D having the highest value of 5.70. M had the lowest value of 0.09. According to WHO criteria, the DMF-T index of this population is in the *high* category.

The prevalence of caries among our study population was 84.48% (Table 3). Of the 174 subjects, caries were found in 147 subjects, either restored or not. Only 27 subjects (15.52%) were caries-free.

Caries Experience	Mean
Decay (D)	5.70
Missing (M)	0.09
Filling (F)	0.12
DMF-T	5.90

**Table 2.** Mean DMF-T Index of 174 people with Down syndrome, aged 14 years and older, in SLB C Jakarta.

Caries Experience	n	Percentage
Caries	147	84.48%
Free caries	27	15.52%
Total	174	100%

**Table 3.** Caries Prevalence of people with Down syndrome, aged 14 years and older, in SLB C Jakarta.

Region	n	D	M	F	DMF-T
West Jakarta	24	6.13	0	0.25	6.38
North Jakarta	8	4.50	0	0	4.50
East Jakarta	44	6.68	0.21	0.12	7.00
Central Jakarta	29	3.48	0.07	0.14	3.69
South Jakarta	69	5.90	0.06	0.09	6.04

**Table 4.** D, M, F, and DMF-T Index of 174 people with Down syndrome aged 14 years and older, in SLB C of DKI Jakarta, by region.

Region	Caries (n)	Percentage	Free Caries (n)	Percentage
West Jakarta	23	95.83%	1	4.17%
North Jakarta	7	87.50%	1	12.50%
East Jakarta	40	90.90%	4	9.10%
Central Jakarta	20	68.96%	9	31.04%
South Jakarta	57	82.60%	12	17.40%

**Table 5.** Caries prevalence among 174 people with Down syndrome, aged 14 years and older, in SLB C of DKI Jakarta, by region.

SLB C	n	D	M	F	DMF-T	p
SLB with dentists	18	6.28	0	0.05	6.78	0.339
SLB without dentists	156	5.63	0.10	0.08	5.77	

**Table 6.** D, M, F, and DMF-T Index of 174 people with Down syndrome, aged 14 years and older, in SLB C Jakarta, with and without school dentists.

Table 4 presents the average DMF-T index scores of 174 people with Down syndrome aged 14 years and older, at SLB C in DKI Jakarta. Research subjects mostly resided in South Jakarta (n=69, 39.65%). The highest average DMF-T was 7.00 in East Jakarta whereas the lowest DMF-T was 3.69 in Central Jakarta. The highest D score (6.68) was found in subjects who resided in East Jakarta while the lowest D score (3.48) was associated with Central Jakarta. In all areas of DKI, D scores on the DMF-T index were significantly greater than M and F scores.

The highest prevalence of caries was found in West Jakarta (95.83%) where there was only 1 caries-free participant, followed by Central Jakarta (68.96%) and South Jakarta (48.27%) (Table 5).

Most study participants did not have a dentist in their school. In this study there were five SLB C in Jakarta that had school dentists who conducted periodic dental examinations. Participants who attended SLB C that had dentists had a mean DMF-T index of 6.78, whereas those in facilities without dentists had

a mean DMF-T index of 5.77, although this difference did not rise to the level of statistical significance ( $p=0.33$ ) (Table 6).

## Discussion

We examined the oral cavities of people with Down syndrome and permanent teeth via a screening procedure, and by exclusion of all third molars. Missing (M) teeth were distinguished from congenital missing teeth by examining the order of the permanent dental eruption period, the history of tooth extraction, and oral cavity conditions such as the presence of root residues indicating dental caries. Among all age groups, D scores were higher than M or F scores. Our results support a high incidence of caries among people with Down syndrome without exposure to balanced caries treatments.

The mean DMF-T index for all people with Down syndrome aged 14 years and older in SLB C Jakarta is 5.9 (Table 2). This result was lower when compared with a previous study of 224 people with Down syndrome, aged 3-22 years, in Riyadh. In this study, the mean DMF-T score was 12.03.<sup>8</sup> However, the DMF-T index in our study was greater than the mean result obtained during a study of 96 children with Down syndrome in Yemen, aged 6-15 years. Here, the mean DMF-T index was 2.45.<sup>10</sup> These differences may have resulted from differences in the number and age range of the people who were examined. A high DMF-T index can occur due to a lack of awareness of the importance of oral hygiene, lack of dental visits, poor parental or caregiver attention to dental and mouth conditions, and a lack of initiative for enacting measures to prevent caries.<sup>10</sup>

In our study, the caries prevalence was 84.48% (Table 3) and only 15.52% of study participants were caries-free. This is consistent with a previous study in Riyadh that found a caries prevalence of 89%, and a study in Yemen that found a caries prevalence of 93.8% in children with Down syndrome.<sup>8,10</sup> Previous research in Chennai found that 29% of people with Down syndrome did not exhibit caries [4]. However, the results of this study contradict a previous study of people with Down syndrome in Portugal that found only 28% exhibited caries.<sup>7</sup> Another study examined

the prevalence of dental caries in 32 children with Down syndrome, aged 8-13 years, and found that 84% were caries-free.<sup>11</sup> Differences in dental caries prevalence may occur due to different levels of awareness of the importance of oral hygiene, different dietary patterns, availability of water fluoridation, and differences in the availability and utilization of dental health care facilities.

Table 4 describes the distribution of the DMF-T index of people with Down syndrome, aged 14 years and older, in SLB C in DKI Jakarta. East Jakarta had the highest average DMF-T score (7.00) with the highest D component among the five areas of DKI Jakarta. The lowest average DMF-T score (3.69) and the lowest D value was found in Central Jakarta. In the five areas of DKI Jakarta, the D component had the highest value compared to M and F. The highest F value was in West Jakarta (0.25) while the lowest F value was in North Jakarta (0). This may be due to a lack of caregiver attention, potentially reducing the frequency with people our study population brushed their teeth. Other potential factors include lack of initiative to visit the dentist, or a lack of cooperation during oral and dental care.

The highest caries prevalence was in West Jakarta with 95.83% and the lowest was in Central Jakarta with 68.96%. West Jakarta, North Jakarta, and East Jakarta all had a caries prevalence greater than the average for DKI Jakarta (84.48%). Differences in the prevalence of caries among Jakarta City Administration areas might be caused by differences in the number of people with Down syndrome who attend school in a SLB C for each region. The five areas of Jakarta were fairly homogenous overall. Thus, public policy should focus on oral health across all areas of Jakarta in an effort to reduce the incidence of caries. Research data can be used to determine public health policy in the area, especially DKI Jakarta, where there is regional autonomy in formulating public policy in accordance with the problem of regional rates of various disabilities. The high incidence of caries in children with Down syndrome is a problem that is incorporated into the public agenda and Regional Health Research so that it can be submitted to local health policy makers. Regional health policy can help

regulate the availability of facilities that support oral health in SLB C by promoting a preventive program of oral and dental health.

There are five SLB C in Jakarta that have dentists who perform dental and mouth examinations regularly (Table 6). The results of this study indicated that the mean DMF-T index of people with Down syndrome who had regular access to dentists was higher than that of those without regular access to dentists, although this difference did not rise to the level of statistical significance. This can be attributed to lifestyle, adherence to dental advice, and caregiver supervision of dental hygiene. Of note, the significant difference in the number of subjects in the various groups likely exerted an effect on our study results. Regardless of their access to regular dental care, the mean DMF-T values were high category. This demonstrates the need for innovative dental health programs in schools and the planning of educational programs that will help establish good oral hygiene practices in this population.

Some study participants who were caries-free exhibited delayed tooth eruption, hypodontia, microdontia, distal teeth, and salivary drooling. These factors are considered protective for caries.<sup>11,13</sup> Previous studies have suggested that low caries prevalence among people with Down syndrome can also be attributed to dietary patterns, salivary function, and immune protection due to increased salivary IgA concentrations specific to *Streptococcus mutans*.<sup>14</sup>

The high incidence of caries in this study, however, may be due to poor oral hygiene in our population of interest, characterized by high plaque and calculus indices. Hypotonic mastication muscles may render chewing is inadequate, increasing the amount of food left in the oral cavity and leading to accumulation of plaque and calculus which can, in turn, lead to periodontal disease. This is in accordance with previous studies that reported a high prevalence of periodontitis in people with Down syndrome.<sup>11,15,16</sup> The high incidence of caries could also be affected by mental development disorders commonly found in people with Down syndrome. These disorders might make brushing and maintaining oral hygiene more difficult for this population.

A sweet diet, infrequent or inappropriate tooth brushing, and low frequency of dental

visits are caries risk factors. Caregivers have a big role in maintaining oral hygiene, especially people with special needs. The high D and low F components found in this study suggest a lack of caregiver initiative to bring people with Down syndrome to the dentist to receive caries treatment. Education on the importance of maintaining oral and dental health in people with Down syndrome is necessary because dental and oral diseases can interfere with quality of life.

### Conclusions

The prevalence of caries in people with Down syndrome, aged 14 years and older, in SLB C Jakarta was 84.48% with the highest to lowest prevalence of caries found in West Jakarta, East Jakarta, North Jakarta, South Jakarta, and Central Jakarta. The average DMF-T score in 174 people with Down syndrome, aged 14 and older, at SLB C Jakarta was 5.90 including a high D component (5.69), compared to M (0.08) and F (0.12).

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### Declaration of Interest

The authors declare that there are no conflicts of interest.

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