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Analyzing the Influence of Parental and Teacher Involvement on Oral Health and Dental Caries in Children with Down Syndrome in Surabaya

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ABSTRACT Down syndrome it is also called trisomy 21 because it has three chromosomes on chromosome 21, whereas normal people only have two. This occurs because chromosome 21 cannot separate during the cell division process, resulting in individuals with 47 chromosomes. The physical and psychological limitations experienced by children with down syndrome cause a lower ability to maintain oral and dental health and result in a higher risk of dental caries compared to normal children. Several recent studies explain that the role of parents and teachers is needed to improve oral health maintenance in order to reduce the risk of dental caries in children with down syndrome. This research aims to analyze the relationship between the role of parents and teachers in maintaining oral health and dental caries in children with down syndrome in the North and East Surabaya. Methods: This type of research is a cross sectional with purposive sampling technique, the total population is 41 down syndrome children and the sample obtained is 37 respondets using the Slovin formula. Data analysis using the Spearman-rank test and multiple regression. The results of the research using the Spearman-rank analysis, the relationship between the role of parents with dental caries (ρ =0.006) and the role of teachers with dental caries (ρ =0.004). As well as the result of multiple regression analysis of the roles parents and teachers with dental caries simultaneously (ρ =0.000). Conclusion: More active role of parents and teachers is needed in reducing the rate of dental caries in children with down syndrome.

INDEX TERMS down syndrome; the role of parents; the role of teachers; dental caries

I. INTRODUCTION

Down syndrome also called trisomy 21 because it has three chromosomes on chromosome 21, whereas normal people only have two. This occurs because chromosome 21 cannot separate during the cell division process, resulting in individuals with 47 chromosomes [1]. Down syndrome is a type of child with special needs that has a limited physical and psychological development due to genetic abnormalities in the womb. Therefore, they have a greater risk of dental caries compared to other normal children [2]. Down syndrome cases in Indonesia tend to increase. Based on the 2010 Riskesdas results it was 0.12%, in 2013 Riskesdas increased to 0.13% and in 2018 Riskesdas increased again to 0.21% [3].

To date, dental caries is still a priority problem because it can occur in anyone regardless of economic situation, age or nation. Dental caries is characterized by tissue damage that starts from the surface of the tooth, can be found on one or more surfaces and can extend to deeper parts, for example, enamel to the pulp [4]. According to results of Basic Health Research, it is known that the prevalence of dental caries reached 88.8% with an average DMF-T index of 7.1, which is in the very high category. The proportion of dental and oral health problems in Indonesia is 57.6%. However, only 10.2% had received services from dental health workers [5]. The DMF-T and def-t scores are adjusted to the caries index criteria according to WHO, namely very low (0.0-1.1), low (1.2-2.6), moderate (2.7-4.4), high (4.5-6.5), very high (≥6.6) [6].

Based on the literature, caries in children with down syndrome are in the lowest category. the lowest rate of caries is due to differences in the composition of saliva, such as high levels of IgA and pH saliva as well as differences of microbial composition [7]. But in reality, caries down syndrome is high, as a study carried out at SLB C Jakarta was 84.48% with an average DMF-T score of 5.9 [8]. Research conducted by Saskianti in Surabaya showed that the average dental caries in children with down syndrome is 7.2, which is classified as very high [9].

Down syndrome parents knowledge of dental and oral health is still low due to a number of factors such as lack of information and insight that supports oral health, relatively old age of parents, elementary school until senior high school education and mother's work as a housewife make DMF-T index of the child down syndrome still high [10]. Parents need to be aware of the importance to keeping their children's teeth healthy. Most parents still think that if dental caries occurs in a primary tooth, it doesn't require treatment, because it will be replaced by a permanent tooth [11].

Previous research on disabled persons (Autisme and Tunagrahita) that parents have shown their role in keeping their children's teeth clean, like brushing their teeth together and showing video of the teeth with holes. However, parents haven't played a role in keeping their children's teeth healthy in checking their teeth regularly every six months. Parents only take their children to the dentist if their children have been complaining of toothache [12].

Results of dental examinations carried out on August 24 2023 on children with down syndrome at SLB BC Optimal Surabaya with a total of 7 students. Obtained a def-t index of 5.57 (high) and a DMF-T index of 2.8 (medium). The high def-t index is because some students experience persistence in the oral cavity of children with down syndrome. Based on the background above, the problem in this research is the high level of dental caries in children with down syndrome in Surabaya. This research aims to identify the role of parents and teachers in maintaining oral health in children with down syndrome, measure dental caries in children with down syndrome, and analyze the relationship between the roles of parents and teachers in keeping dental and oral health with dental caries in children with down syndrome in extraordinary schools areas North and East Surabaya.

II. METHOD

This research was carried out at extraordinary schools North and East Surabaya which was held from December 2023 to February 2024. This research method used is correlation analytical research with cross sectional design.

The population in this research was 41 children with down syndrome in extraordinary schools North and East Surabaya. The size of the sample determined by Slovin formula, so that the number of samples was 37 respondents with purposive sampling techniques, namely the sampling technique by selecting a sample among the population according to the researcher's considerations, so that the sample can represent previously known population characteristics. The inclusion criteria are children with special needs with down syndrome type at extraordinary schools North and East Surabaya who are willing to fill in informed consent (signed by father or mother), as well as parents and teachers who are ready to participate in the research as a respondents with signed informend consent.

The data collection method on the independent variable is the role of parents and teachers in this research by filling in the questionnaire sheet and on the dependent variable of dental caries in children with down syndrome by conducting an examination. The data collection instrument is carried out by the researchers with the measurement of the roles of the parents and the teachers using the questionnaires sheet as well as the examination sheet DMF -T to measure the dental caries, where previously the respondents filled in the form informed consent to be prepared to be respondents in this research. The questionnaires used have been modified and tested for validity and reliability on respondents with similar characteristics in different extraordinary schools regions.

This research procedure each respondent parents (father or mother) and teachers who have met the inclusion requirements will be given a questionnaire sheet to be filled with a check mark on one of the answers. There are 4 choices of answers in each statement column: always, often, rarely, and never on the questionnaire sheet. Further data processing involves scoring each answer with a numerical code, inserting it into a table to make reading easier, and entering the data into the SPSS program to be processed according to the specified analysis techniques. The role assessment criteria used (Arikunto, 2016) are good 76-100%, enough 56-75%, less <56%. The DMF-T evaluation criteria are adjusted to the WHO caries index of very low (0,0-1,1), low (1,2-2,6), moderate (2,7-4,4), high (4,5-6,5), very high (≥6,6).

Researchers used modified role theory by Soerjono Soekanto and health status theory by HL. Blum. Role theory is divided into three, namely active roles, passive roles and participative roles [13]. Person's health status is influenced by behavior, environment, health services, and heredity [14]. The role of parents and teachers is an active role that can influence the child's behavior and the child's behavior influences their health status, in this case dental caries in down syndrome.

The analysis technique used in this research is the Spearman-rank test to test the correlation hypothesis with a minimum ordinal variable measurement scale, as well as using the multiple regression test to determine the influence of independent variables simultaneously on the dependent variable. The significance value (α) used is 0.05.

III. RESULTS

According to data presented in TABLE 1, it can be inferred that the most of research's parent participants were female (73%), whereas just (27%) of them were male. Regarding age, the most of research's parent participants 41-50 years old (35.1%). TABLE 2 shows that the most of teacher respondents are female (91.9%) with the most aged 20-30 years. TABLE 3 shows that the most of respondents with down syndrome children are male (54.1%) with the most aged 11-15 years (48.6%). TABLE 4 shows that ρ value of 0,006 means that there is a relationship between the role of parents in maintenance oral health with dental caries in children with down syndrome, with a level of strong correlation strength as well as the direction of the relationship with negative values. A negative (inverse)

relationship indicates that the better the role of parents, the lower the dental caries in children with down syndrome. TABLE 5 show that ρ value 0,004 means there is relationship between the role of teachers in maintenance of oral health with dental caries in children with down syndrome, with a enough correlation strength level as well as the direction of the relationship is negative. A negative (inverse) relationship indicates that the better the role of parents, the lower the dental caries in children with down syndrome. TABLE 6 show that ρ value 0,000 means that the role of parents and teachers has significant influence together on dental caries in children with down syndrome.

TABLE 1
Characteristics of Respondents from Parents of Down Syndrome Children

Characteristics		Frequency	Percentage (%)
Gender	Male	10	27
	Female	27	73
Age	20-30 years	2	5.4
	31-40 years	12	32.4
	41-50 years	13	35.1
	51-60 years	10	27
Education	Elementary School	11	29.7
	Junior High School	3	8.1
	Senior High School	14	37.8
	S1	9	24.3
Work	Doesn't work	1	2.7
	Civil servants	1	2.7
	Self-employed	12	32.4
	Businessman	2	5.4
	Housewife	21	56.8

Based on TABLE 1 showed that the most of respondents were female, namely 27 people (73%). Characteristics of respondents aged 41-50 years were 13 people (35.1%). The educational characteristic of most respondents was high school, namely 14 people (37.8%). Job characteristics show that the most of respondents' job levels are housewife, namely 21 people (56.8%).

TABLE 2
Characteristics of Teacher Respondents for Children with Down Syndrome

Characteristics		Frequency	Percentage (%)
Gender	Male	3	8.1
	Female	34	91.9
Age	20-30 years	17	45.9
	31-40 years	9	24.3
	41-50 years	3	8.1
	51-60 years	8	21.6
Education	S1	33	89.2
	S2	4	10.8

Based on TABLE 2 showed that the most of teacher respondents were female, namely 34 people (91.9%). The characteristics of respondents aged 20-30 years were 17 people (45.9%). The educational characteristics of most teacher respondents were S1, namely 33 people (89.2%). Based on TABLE 3 showed that the most of respondents with down syndrome children were male, namely 20 people (54.1%). Characteristics of respondents aged 11-15 years were 18 people (48.6%). The characteristics of the DMF-T index show that the most of children with down syndrome in extraordinary schools in North and East Surabaya are in the category (≥ 6.6) very high with 18 people (48.6%).

TABLE 3
Characteristics of Respondents from Down Syndrome Children

Characteristics		Frequency	Percentage (%)
Gender	Male	20	54.1
	Female	17	45.9
Age	6-10 years	12	32.4
	11-15 years	18	48.6
	16-20 years	6	16.2
	21-25 years	1	2.7
DMF-T	0.0-1.1	4	10.8
	1.2-2.6	3	8.1
	2.7-4.4	7	18.9
	4.5-6.5	5	13.5
	≥ 6.6	18	48.6

TABLE 4
Analysis of the Relationship between the Role of Parents in Maintaining Dental and Oral Health with Dental Caries in Down Syndrome Children in Extraordinary Schools in the North and East Surabaya Region

		The role of parents				
		Less	Enough	Good	n	ρ *value*
Caries Tooth	Very high	4	13	1	18	0.006
	High	1	3	1	5	
	Moderate	2	4	1	7	
	Low	0	1	2	3	
	Very low	0	1	3	4	
	n	7	22	8	37	
Correlation coefficient		= -0.564				

Based on TABLE 4 it is known that value ρ *value* amounting to 0.006, which is smaller than 0.05, In conclution that there is a relationship between the role of parents in maintaining oral health with dental caries in children with down syndrome in extraordinary schools in the North and East Surabaya areas. So H_1 is accepted while H_0 is rejected. Survey results averaged a parent's role of 74.14% in a sufficient category, with most of them answering "often" to every statement.

TABLE 5
Analysis of the Relationship between the Role of Teachers in Maintaining Dental and Oral Health with Dental Caries in Down Syndrome Children in Extraordinary Schools in the North and East Surabaya Region

		Teacher's Role				
		Less	Enough	Good	n	ρ *value*
Caries Tooth	Very high	11	7	0	18	0.004
	High	2	3	0	5	
	Moderate	5	2	0	7	
	Low	0	0	3	3	
	Very low	0	2	2	4	
	n	18	14	5	37	
Correlation coefficient		= -0.460				

Based on TABLE 5 it is known that value ρ *value* amounting to 0.004, which is smaller than 0.05, it can be concluded that there is a relationship between the role of teachers in maintaining oral health and dental caries in children with down syndrome in extraordinary schools in the North and East Surabaya areas. So H_1 is accepted while H_0 is rejected. Survey results averaged a teacher's role of 66,84% in a sufficient category, with most of them answering "often" to every statement.

TABLE 6
Multiple Regression Analysis of the Role of Parents and Teachers in Maintaining Dental and Oral Health with Dental Caries in Down Syndrome Children in Extraordinary Schools in the North and East Surabaya Region

Variable	Regression Coefficients	t_{count}	ρ
Constant	24,891	4,951	0,000
The role of parents	-0.101	-2,107	0.043
Teacher's Role	-0.238	-2,049	0.048
R	= 0.275		
R2	= 0.075		
Fcount	= 6.439		
ρ	= 0.000		

Based on TABLE 6 it is known that value $\rho < 0.05$ and there is a negative relationship and a significant influence together, namely the role of parents and the role of teachers on dental caries in children with down syndrome. If the role of parents and teachers increases, dental caries in children with down syndrome will decrease.

IV. DISCUSSION

According to results of research on 37 respondents at extraordinary school in North and East Surabaya, January 2024. In this research, the role of parents and teachers were measured using a modified questionnaire sheet and tested for validity and reliability. The role questionnaires of parents consisted of 27 statements, the role questionnaries of teachers consisting of 15 statements and each statement represented several aspects of the active roles. The use of the DMF-T index in the dental caries examination of children with down syndrome has several advantages: it is simpler, easier, and more accurate to use in research [6].

TABLE 3 and TABLE 4 show that the most of respondents have a very high category of tooth caries with the role of parents in the enough category. This is because some parents still rarely nurse and educate their children to brush their teeth after breakfast and before sleep at night, rarely teach their kids to peel after eating sweet and sticky foods, rarely teach children to regularly consume vegetables and fruits, rare to get tooth checks at least once in six months, and rare to teach kids to replace their toothbrush at least every three months. The importance of brushing teeth on time can affect oral hygiene. The right time is after breakfast and before sleep at night, especially brushing your teeth before bed at night because the saliva flow is inactive during the day when the bacteria will multiply faster than the rest of the food [15]. It is supported by Situmeang research that the maintenance of dental and oral health in children with down syndrome is influenced by the role of parents, this is due to the limitations that children have with down syndromes [16], so that parents should play an extra role in terms ofining their children's oral and dental health.

The results of research on the role of teachers in maintaining oral health with dental caries in children with down syndrome in extraordinary schools in the North and East Surabaya areas are in the enough category. This is because most teachers rarely educate their students to rinse their mouths after eating at school, teachers rarely instruct students to bring toothbrushes and fruit as snacks to school. The importance of teachers in instructing students to bring toothbrushes to school to keep the health of their teeth and mouth, because most children with down syndrome spend their time at school means that teachers also play a role in promotive actions [12]. It is very important to consume fruit and vegetables which contain lots of fiber and water which can be useful as a natural mouth cleanser or self-cleaning when you cannot brush your teeth directly after eating [17].

High level of dental caries indicate that the dental hygiene of the child with down syndrome is'n in good condition. One of the factors that causes the formation of dental caries in children with down syndrome is their physical and psychological limitations which make them unable to maintain dental and oral health especially in terms of brushing teeth independently and properly. This is in line with Gufran's research that children with down syndrome have a greater risk of developing dental caries than other normal children because of genetic limitations or abnormalities prior to birth [18]. According to the research conducted by Isabella at SLB C Jakarta stated that the DMF-T child caries index down syndrome belongs to the high category [8].

This is different frome the results of Amelia's research which stated that down sydnrome had a DMF -T caries Index in the low category [2]. Other researchers say that DMF-T dental caries index for down syndrome in the moderate category [19]. Differences from some research results may be due to internal factors (tooth condition, saliva composition, pH) and external factors of child down syndrome (family economic condition, parental education, social environment such as parental role, as well as teacher role) [20].

According to results of research that has been carried out and analyzed using Spearman-rank, it was found that the role of parents in maintaining oral health and dental caries in children with down syndrome has a significant relationship. This can be seen from the role of parents as educators, encouragers and supervisors, where most parents often provide examples and supervise the correct way to brush their teeth and often remind children when they often consume cariogenic foods. This is also in accordance with

research conducted by Artini & Permatasari that food consumption and the role of parents in brushing teeth habits are related to the incidence of dental caries at SLB Dharma Bakti Dharma Pertiwi Bandar Lampung [21]. The role of teachers also has a significant relationship in maintaining oral health and dental caries in children with down syndrome. This can be seen from the role of teachers as teachers and trainers, where most teachers often teach students to change their toothbrushes every 3 months and train their students to brush their teeth. Research conducted by Pay shows that knowledge, motivation and the role of teachers have a significant relationship with dental and oral health maintenance behavior in grade VII elementary school students in Baumata Village, Taebenu District [22].

Research conducted by Brignardello shows that the DMF-T rate for children with down syndrome is lower than for people with other disabilities [23]. The low level of dental caries in children with down syndrome is due to differences in the composition of their saliva. These compositions include high levels of IgA and pH of saliva as well as differences in the composition of microbes found in the saliva of down syndrome sufferers [7]. Parents play a role in helping and keeping the health of the teeth and mouth of people with down syndrome. However, they do not know the changes in the condition of the oral cavity experienced by their children because of ignorance and understanding about dental and oral health. According to Manbait, parents are one of the most important elements in the development of health, specifically dental and oral health [24].

According to HL. Blum theory. Person's health status is influenced by the environment, behavior and health services [14]. The environment for children with down syndrome in question is parents at home and teachers at school. Parents and teachers can influence the health status of children with down syndrome. In this case the role of parents and teachers is also influenced by the knowledge they have. According to Soerjono Soekanto's role theory, a person's roles are divided into active roles, passive roles and participative roles [25]. These three types of roles can determine a person's role boundaries, such as the active role of being a parent and teacher. All types of roles carried out by parents and teachers will influence the child's behavior and health status, in this case the dental and oral health status of children with down syndrome (DMF-T index). Toothbrushing behavior is a habit that parents must teach and get used to to their children because it is related to dental caries in children with disabilities, especially children with down syndrome.

Based on the research that has been conducted, it is known that the role of parents and teachers is in the enough category. The DMF-T caries index for children with down syndrome reaches the very high category. There are some parents who have a good role, but their children's DMF-T caries index is still very high. This can happen because down syndrome children have deficiencies in physical and psychological development, many parents allow their children to consume sweet and sticky foods, and many do not have regular dental check-ups, which affects the behavior of down syndrome children in maintaining healthy teeth and mouth. Several factors can also influence the high rate of dental caries in children with down syndrome. Therefore, parents and teachers must play an extra role in helping children with down syndrome maintain healthy teeth and mouth.

The role of parents has a strong relationship with children with down syndrome experiencing dental caries, while the role of teachers has a enough relationship with children with down syndrome experiencing dental caries. The role of parents and teachers both have a negative relationship with dental caries in children with down syndrome. A negative (inverse) relationship indicates that the better the role of parents, the lower the dental caries in children with down syndrome. The results of analysis using multiple regression also show that the roles of parents and teachers simultaneously have a significant effect on dental caries in children with down syndrome. Thus, between the theory used and the results of research that has been carried out in the field, it is true that parents and teachers still need a more active role in reducing the rate of dental caries in children with down syndrome.

The implication of this research is to provide data about the role of parents and teachers in maintaining dental health with dental caries in children with down syndrome in special schools in North and East Surabaya, so that this study can be used as input for health workers regarding dental caries in children with down syndrome in special schools. Dental caries in North and East Surabaya is still very high so extra attention is needed, especially for children with Down syndrome, such as developing the UKGS program in special schools as well as on going counseling for teachers and parents of children with disabilities, especially down syndrome. This is important to do so that children with down syndrome and their parents can get used to having dental examinations and treatment at other health service facilities.

The limitations of this research are the number of respondents and the short time to carry out dental examinations of children with down syndrome, which requires a first approach. There were several respondents who were uncooperative and didn't want to open their mouths, making it difficult for researchers to identify the condition of the oral cavity of children with down syndrome.

V. CONCLUSION

The role of parents in maintaining dental and oral health with dental caries in children with down syndrome in extraodinary schools in the North and East Surabaya region is in the enough category with a score of 74.14%. The role of teachers in maintaining oral health with dental caries in children with down syndrome in extraordinary schools in the North and East Surabaya region is in the enough category with a score of 66.84%. Dental caries in children with down syndrome in Extraordinary schools in the North and East

Surabaya areas is in the very high category. The role of parents and teachers in maintaining oral health shows a strong level of correlation strength and a ρ value of 0,006, for the role of teachers shows a enough level of correlation strength and a ρ value of 0,004. The direction of the correlation between the role of parents and the role of teachers is not in the same direction towards dental caries in children with down syndrome, and the roles of parents and teachers have a significant relationship together towards dental caries in children with down syndrome.

Parents must play an extra role in maintaining good oral health for their children, so as not to affect the child's growth and development. Teachers or extraordinary schools must work together with local health workers in order to reduce caries which is still very high with various dental and oral health programs. For future researchers, its hoped that they will be able to cover more respondents and for a longer time so that they can approach the respondents first. In this way the results obtained will be better.

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