

Prevalence of Medically Compromised Children Regarding Dental Caries and Treatment Needs in Wahidin Sudirohusodo Hospital

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Abstract

The main problem of oral cavity among children in Indonesia is dental caries. Risk of caries on children with systemic diseases will be different with children without systemic diseases. Children with high caries risk should be given special care by doing intensive treatment to remove caries or decrease the caries risk.

To determine the prevalence of dental caries and treatment needs among medically compromised children in Wahidin Sudirohusodo Hospital.

Cross-sectional study and descriptive-observational approach. A total of 53 patients of Wahidin Sudirohusodo hospital were included in this study as a sample of accidental sampling method. Caries status of patients measure using DMF-T index, and treatment need status measure (using TNI/UTN index) were recorded by clinical observation.

Prevalence of dental caries among medically compromised children, in this cases is thalassemia diseases, is high (57,1%) with caries status is poor (based on WHO scores) and treatment needs status is moderate which need restoration treatment about one or two surfaces.

There is a relationship between caries prevalence and systemic diseases.

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Introduction

Growth is a critical indicator of child health and its importance is recognized by the World Health Organization (WHO) which identifies growth assessment as the best single measure for defining the nutritional status and health of children as well as being an indicator of the quality of life in whole population.¹

According to definition of World Health Organization (WHO), quality of life (QoL) is how people evaluate their life condition according to their cultural criteria. Recently introduced descriptions about QoL accentuate on the difference between one's prospects and the reality. Although oral disorders are rarely life

threatening they can have a dramatic impact on peoples' well-being.²

It has been demonstrated that quality of life can be affected by factors such as gender, age, tooth loss, cultural background, socioeconomic status, and anxiety about dental procedures.² There are several factors that may contribute to poor oral health in patients with psychosocial disorders. These include saliva reducing medications being taken, poor diet, and apathetic nature of many psychiatric patients.³ Local and systemic factors may be cause for these developmental disturbances and also these factors may be effect to single tooth or more teeth. The etiology of these conditions are usually attributed to certain genes and also some etiological events in the prenatal and postnatal periods that may result in anomalies of tooth size, shape, position, number and structure.⁴

The role of diet and nutrition in growth and dental caries is well known and poor growth,

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obesity and childhood caries are three substantial public health problems. It has been well documented in animals that early malnutrition affects tooth development and eruption and can result in increased dental caries later in life.⁵

Over the last decade, the role of childhood underweight and obesity on later development of oral health disease and conditions was well documented, furthermore some acute and chronic health conditions can deteriorate their clinical condition. In many recent research papers related to childhood underweight, overweight and obesity characterized through Body Mass Index (BMI) showed that weight disproportion conditions are serious social and public health problem.⁶

Oral health conditions and dental caries prevalence related to Body Mass Index (BMI) is well documented in the current literature, therefore revealing the correlation between those factors can improve the overall public health strategies and promote oral health habits among children and young adolescents, in addition, both obesity and caries have common determinants and require a comprehensive, integrated management approach by multidisciplinary teams.⁶

In Indonesia, dental caries is the most oral health problems that still need attention. Based on Household Health Survey (Household Health Survey, 2004), the prevalence of caries in Indonesia reached 90.05%. Also, Basic Health National Research (Riskesdas, 2007) reported that DMF-T scores is still high. Tooth decay is the most prevalent chronic childhood disease affecting 50% of the first graders resulting in almost 52 million missed school hours.⁷

Dental caries is caused by the direct and indirect factors. Direct factors are host, agents or microorganisms, substrates or diet, and time. Indirect factors (a risk factor for caries) are caries history or experience among other things, fluoride uses, oral hygiene, total bacteria, saliva, and life style.⁸ The risk of caries infection among children with systemic disease history, will be different with children without systemic disease. This increase of caries risk is resulting from several direct and indirect factors or defense mechanisms of oral cavity which not sufficient. It is lead to the differences of caries prevalence. Commonly, uncontrolled systemic disease can change the oral and salivary condition in terms of

both its composition and salivary flow. This resulting the risk of caries infection among children become higher.⁹

Medically compromised is condition of a patient with disorder or condition that must be compromised to a physician before any health procedures relating to treat the specific disease. The systemic conditions that are classified as medically compromised conditions include allergies, haematological disorders, metabolic-endocrine disorders, cardiovascular disorders, coagulation disorders, kidney disorders, and pregnancy.^{9,10}

Children with high caries risk should be given special care by doing intensive treatment to remove caries or decrease the level of caries risk.¹¹ In Thailand, the prevalence of caries among medically compromised children is 12.2%.¹² In Makassar, there is no studies have reported the prevalence of dental caries among medically compromised children. This condition has encouraged researcher to conduct studies among children who visited the polyclinic and Lontara IV rooms at Wahidin Sudirohusodo Hospital.

Materials and methods

This cross-sectional study was take place at Lontara IV (patients room) and children polyclinic in Wahidin Sudirohusodo Hospital. Patients, who meet the inclusion criteria, were included in this study as a sample by using accidental sampling method. Before oral examination was performed, the parents of each samples signed *informed consent*. Intra-oral examination result, caries status, and oral condition was written. Prevalence was calculated from ***caries prevalence formula*** and analyzed based on result obtained from DMF-T (*Decay Missing Filling- Tooth*) index. Caries treatment needs was measured by using TNI (*Treatment Need Index*) index and mean value was measured using UTN (*Unmed Treatment Index*).

Caries prevalence formula

$$\text{Caries prevalence} = \frac{\text{Total caries}}{\text{Total sample}} \times 100\%$$

Scoring Analyze

WHO has defined category about caries status based on DMF-T and DEF-T index, with the

following details: (1) **incipient** (0,0 – 1,1); (2) **mild**(1,2 – 2,6); (3) **moderate**(2,7 – 4,4); (4) **advanced**(4,5 – 6,5); (5) **severe**(> 6,6). [10]

TNI scoring about treatment need for caries, with following details: TNI-0 (**healthy**); TNI-1 (**preventive**); TNI-2 (**sealant**); TNI-3 (**initial**); TNI-4 (**moderate**); TNI-5 (**advanced**); TNI-6 (**severe**).

Results

Based on the examination process, it shows that hearth disease is more often found at Wahidin Sudirohusodo hospital with 35 patients (**Table1**).

Diseases	Age	Male	Female
Heart	6-16 years old	21 patients	14 patients
Leukemia	5-14 years old	8 patients	3 patients
Thalasemia	5-14 years old	3 patients	4 patients

Table1. Distribution of diseases at Wahidin Surdirohusodo Hospital.

Table 2 shows that female (42,9%) is more risk to be infected caries than male.

Sex	Caries					Total
	Incipient	Mild	Moderate	Advance d	Severe	
	n(%)	n(%)	n(%)	n(%)	n(%)	
Male	12 (37,5%)	11 (34,4%)	8 (25,0%)	1 (3,1%)	0 (0,0%)	32 (100,0%)
Female	7 (33,3%)	9 (42,9%)	2 (9,5%)	2 (9,5%)	1 (4,8%)	21 (100,0%)
Total	19 (35,8%)	20 (37,7%)	10 (18,9%)	3 (5,7%)	1 (1,9%)	53 (100,0%)

Table 2. Caries risk prevalence by sex.

From the table above, caries is more often seen in children aged 13-16 years old who has **mild** caries (47,4%). Moreover, children aged 5-8 years old who has **advanced** (15,4%)and **severe** caries (7,7%). It means that children aged 5-8 years old were more often infected with caries. (**Table 3**)

Age	Caries					Total
	Incipient	Mild	Moderate	Advance d	Severe	
	n(%)	n(%)	n(%)	n(%)	n(%)	
5-8 years old	4 (30,8%)	4 (30,8%)	2 (15,4%)	2 (15,4%)	1 (7,7%)	13 (100,0%)
13-16 years old	6 (31,6%)	9 (47,4%)	4 (21,1%)	1 (4,8%)	0 (0%)	20 (100,0%)
Total	10	13	6	3	1	33

Table 3. Caries prevalence by age.

Prevalence of caries was seen very high in children with thalasemia disease with percentage 57,1% (**Table.4**).

Diseases	Caries				
	Incipient	Mild	Moderate	Advance d	Severe
	n(%)	n(%)	n(%)	n(%)	n(%)
Heart	16 (45,7%)	12 (34,2%)	7 (20,0%)	0 (0%)	0 (0%)
Leukemia	3 (27,2%)	4 (36,3%)	3 (27,2%)	0 (0,0%)	1 (9,09%)
Thalasemia	0 (0,0%)	4 (57,1%)	0 (0,0%)	3 (42,8%)	0 (0,0%)
Total	19	20	10	3	1

Table 4. Caries prevalence by diseases.

The most treatment was needed from all samples is restoration with one or two surfaces (**Table5**).

Category	Total response	Presentase	Treatment needs
TNI-0	6	11,32%	None
TNI-1	-	0%	-
TNI-2	12	22,64%	Fissure sealant
TNI-3	14	26,42%	Restoration (one surfaces)
TNI-4	19	35,85%	Restoration (one or two surfaces)
TNI-5	-	0%	-
TNI-6	2	3,77%	Restoration with artificial tooth

Table 5. Treatment needs by the severity level of caries.

Also it shows that for heart disease need TNI-4 treatments, leukimia need TNI-2 and TNI-3 treatments, and thalasemia disease need TNI-4 treatments (**Table 6**).

Diseases	TNI-0	TNI-1	TNI-2	TNI-3	TNI-4	TNI-5	TNI-6
Heart	5 (14,2%)	- (0,0%)	7 (20,0%)	8 (22,85%)	13 (37,14%)	- (0,0%)	2 (5,71%)
Leukemia	1 (9,09%)	- (0,0%)	5 (45,4%)	5 (45,4%)	- (0,0%)	- (0,0%)	- (0,0%)
Thalasemia	- (0,0%)	- (0,0%)	- (0,0%)	1 (14,2%)	6 (85,71%)	- (0,0%)	- (0,0%)

Table 6. Treatment needs of caries by the TNI index.

Caries prevalence can be obtained from formula below:

$$\text{Caries prevalence} = \frac{\text{Total caries on childre}}{\text{Total sample}} \times 100\%$$

$$= 47 / 53 \times 100\%$$

$$= 88.68\%$$

After calculating, the prevalence of caries in children with medically compromised is equal to 88.68%.

Discussion

A total of 53 patients were included as samples, it was consist of 32 male patients (60,3%) and 21 female patients (39,6%).

Table 2 shows that for mild category, female patients have a greater caries risk compare to male patients. This can be seen in the results where female patients who have mild caries category amount 42,9% than male patients who have mild caries category amount 34,4%. However, for moderate category, male patients have higher risk amount 25% than 9,5% for female patients. It means that male patients have higher risk of caries than female patients.¹³

This study showed that caries prevalence be seen most in children with cancer disease especially thalassemia. Thalassemia is a genetic disorder that causes the synthesis of hemoglobin to be absent or less due to globin chain synthesis disorder which is a major component of hemoglobin. The disruption of this globin chain leads to the occurrence of abnormal globin chains that will undergo the erythrocytes preservation. Thalassemia has multiple clinical manifestations include anemia with diverse severity. Thalassemia patients experience physical changes and psychosocial changes. Physical changes include having chronic anemia that causes the patient will be experience *hypoxia*, headache, irritable, *anorexia*, chest and bone pain, and intolerance activities.¹⁴

Generally, children with thalassemia (beta major patients) shows severe clinical symptoms such as anemia, hepatosplenomegaly, malnutrition, can not grow normally and experience growth retardation from birth. Impaired growth in patients with thalassemia caused by various factors, including hormonal factors due to hemokromatose on endocrine glands and tissue *hypoxia*. Other factors that play role in the growth of thalassemia patients are genetic and environmental factors. Nutrition is an important environmental factor in influencing children's growth.¹⁴ Thalassemia major is a disease characterized by reduced levels of hemoglobin in the blood so that patients with red blood deficiency can cause anemia. Patients with thalassemia beta major is generally experiencing growth and malnutrition disorders, where weight and height by age are below the 50th percentile grade.^{15,16,17} Although, thalassemia minor is present at birth and will remain for a whole life,

even minor thalassemia does not require transfusions blood throughout his life.¹⁸

Thalassemia disease will also affect the condition of oral cavity, where there will be widening the jaw shape, diastema, and protrusion of the maxillary incisors. In addition, for transition of primary to permanent teeth causes the changes of dental arch, intermolar width, and intercaninne. The most significant changes be seen in the anterior arch.¹⁹

Cancer patients did chemotherapy more often. Chemotherapy is a drug used in cancer therapy to suppress, destroy, and prevent the spread of cancer cells which rapidly multiple itself. These drugs affect both cancer cells and normal cells, and in certain quantities can cause side effects on oral mucosa and gastrointenal, hair follicles, the reproductive and hematopoietic system.²⁰ Agent or chemotherapy drugs that may damage the oral mucosa including the class of *alkylating* (*busulfan*, *cyclophospamide*, *procarbazine*, and *thiotepa*), *anthracyclines* (*daunorubicin*, *doxorubicin*, and *epirubicin*), *anti-metabolites* (*cytosine arabinoside*, *hydroxyurea*, *5-fluoracil*, *methotrexate*, *6-mercaptopurine*, and *6-thioguanine*), *antibiotics* (*actinomycin D*, *amsacrine*, *bleomicyn*, and *mitomycin*), and *vinka alkaloids* (*vinblastine* and *vincristine*). Chemotherapy and radiotherapy have side effects or complications in the oral cavity.^{20,21} Oral complications due to chemotherapy were divided into two forms of complications (directly effect the oral mucosa (*direct stomatotoxicity*) or the effects of mucosa changes (indirect stomatotoxicity) in myelosuppression condition.^{22,23} Direct stomato-toxicity is *mukositis*, *xerostomia*, and *neurotoksik* while indirect stomatotoxicity is bacterial infection, viral, and fungi also bleeding because of *trombositopenia*.^{24,25}

Mucositis can cause pain, difficulty opening mouth, difficulty chewing food, and also can be a entry gate of bacteria. The lesions usually occur on non-keratinising areas such as buccal and labial mucosa, lateral dorsum, the floor of mouth, and pallatum palate. Xerostomia is a reduction in salivary secretion that causes saliva composition become thick and low pH thus affect the occurrence of caries and other oral infections.²⁵ Cytotoxic agents (especially *adriamycin*) can cause xerostomia. Nutrition deficiency also can be one of the adverse effect of chemotherapy. Cytotoxic effect from chemotherapy agent to oral mucosa can cause

pain, disorders of mastication and dysphagia for mucosal atrophy. This disruption ultimately causes mucositis and ulcers.^{26, 27}

In other study conducted at RSUP H. Adam Malik, Medan region, there are almost 75% patients who experience mucositis after receiving high-dose or combination chemotherapy. Then, over 40% patients experience oral complications. This study conducted with 57 patients as total samples who had chemotherapy less 2 cycles for 12 months and assisted with questionnaires. The results obtained is an patients who experience oral mucositis amount 75.4% of 57 total patients receiving chemotherapy. Then, 20.54% got dry mouth and 14.87% got ulcer. This research has prove that the incidence of high oral mucositis in chemotherapy patients and chemotherapy has a relationship with oral cavity problem.^{28,29}

In this study about caries treatment needs, the result was obtained that the most treatment need is moderate. Moderate treatment is the needs of restoration with one or two surfaces.

Conclusions

The conclusion of this study is prevalence of dental caries among medically compromised children, in this cases is thalassemia diseases, is high (57,1%) with caries status is poor (based on WHO score (1,2)) and treatment need status is moderate with restoration treatment about one or two surfaces. From collected data, one of external factor is chemotherapy and medicine have strong relationship with on oral health care of children.

Declaration of Interest

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