



## Profile of Children with Congenital Heart Disease and Upper Respiratory Tract Infection in Dr. Soetomo General Hospital Surabaya Period March 2018

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### ABSTRACT

**Introduction:** Congenital Heart Disease (CHD) is the leading cause of death in the first year of life. One of the manifestations of CHD is upper respiratory infection (URI). In Indonesia, 90% of the acute respiratory infection is URI and it becomes the most common reason for children to go to emergency center. The aim of this study is to describe the profile of children with congenital heart disease and upper respiratory tract infection (URTI) in Dr. Soetomo General Hospital, Surabaya, based on sex, age, immunization status, social-economic status, and type of CHD.

**Methods:** This descriptive study was done by collecting data using medical records and questionnaires from March 1<sup>st</sup> to 31<sup>st</sup> 2018.

**Results:** Total number of the sample was 46 patients; 18 (39.1%) of them were male and 28 (60.9%) were female, with male to female ratio was 1:1.6. The most common age group (69.6%) was toddler (0-5 years old). The most common type of CHD was acyanotic (89.1%).

**Conclusion:** Female patients had more (80%) severe URI than male patients. Patients with severe URI only occur in toddlers. Interestingly, 60% of patients with severe URI had complete immunization. Patients with severe URI had parents with moderate (60%) and low income (40%). There were 100% of patients with severe URI who had acyanotic CHD.

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**Introduction**

Congenital heart disease (CHD) is abnormal defect of the heart or large blood vessel which is happening during developing process of the embryo<sup>1</sup>. The defect varies from minor ventricle septum defect which only needs a month of treatment until more complex ventricle abnormalities which need emergency treatment<sup>2</sup>. CHD is the leading cause of death in the first year of life<sup>3</sup>. The incidence of CHD varies from 4/1000 until 50/1000 live birth<sup>1</sup>.

CHD becomes risk factor of some diseases, one of them is upper respiratory tract infection (URTI). Patients with CHD have big risk to get vascular respiratory problem. Children with CHD have heavy blood flow to the lungs which leads to enlargement of lung tissue volume. The air volume of left lung will proportionally be smaller than the right lung caused by the pressure from the heart<sup>4</sup>. Children with CHD and having respiratory infection will recover longer than normal ones because heart disease worsen that condition<sup>5</sup>.

URTI can be caused by viruses, such as Adenovirus and Rhinovirus<sup>6</sup>. URTI included in most frequent infection diseases in children with six to eight episodes in a year and it's categorized into the most frequent reason for children to go to emergency room<sup>7</sup>.

Profile of children with CHD and URTI is still not completely known by many people. Therefore, the researcher was interested in conducting this research to get to know more about profile of children with CHD and URTI in Dr. Soetomo General Hospital, Surabaya.

**Methods**

This study used a descriptive research design conducted at Outpatient Clinic of Dr. Seotomo General Hospital, Surabaya and carried out from March 1<sup>st</sup> to 31<sup>th</sup> 2018. The total number of subjects were 46 patients. The population in this study were all children with CHD at Outpatient Clinic of Dr. Seotomo General Hospital, Surabaya. The subjects in this study were children with CHD and URTI at Outpatient Clinic of Dr. Seotomo General Hospital, Surabaya in the period of March 1<sup>st</sup> to 31<sup>th</sup> 2018 below the age of 18 years. This study used secondary data in the form of medical records. Besides, this study also used questionnaires for completing data. Research had received ethical approval from Research and Development Department of Dr. Seotomo General Hospital, Surabaya with the number of ethics permit 0023/KEPK/II/2018. Data obtained from medical records were processed using Microsoft Excel 2016, then presented in table form.

**Results**

In this study, a total subject is 46 patients of children with CHD and URTI.

Table 1. Characteristic of Children with CHD and URTI in Dr. Soetomo General Hospital, Surabaya in the Period of March 1<sup>st</sup> to 31<sup>th</sup> 2018.

Characteristic	Frequency (n=46)	%
<b>Gender</b>		
Male	18	39.1
Female	28	60.9
<b>Age Category</b>		
Toddler (0-5 years)	32	69.6
Children (5-11 years)	8	17.4
Early teenager (12-16 years)	6	13
Late teenager (17-25 years)	0	0
<b>Immunization record</b>		
Completed	33	72
Not completed	13	28
<b>Parents' income/month</b>		
Low (< Rp.500.000,00)	6	13
Moderate (Rp.1.500.000,00 to Rp.2.500.000,00)	16	34.8
High (Rp.2.500.000,00 to Rp.3.500.000,00)	17	37
Very high (> Rp.3.500.000,00)	7	15.2
<b>Type of CHD</b>		
Cyanotic	5	10.9
Acyanotic	41	89.1

Table 1 shows that the distribution of female patients is larger than male patients with ratio 1:1.6, with the largest distribution of patients is in the age group of 0-5 years (69.6%). Most patients with CHD and URTI have completed immunization record (72%). Besides, there were 34.8% patients with moderate parent's income per month and most of the patients with URTI had acyanotic CHD (89.1%).

Table 2. Distribution of Severity of URTI Based on Immunization Record.

Immunization Record	Severity of URTI					
	Mild		Moderate		Severe	
	f	%	F	%	f	%
Completed	15	83	19	70	3	60
Not completed	3	17	8	30	2	40
Total	18	100	27	100	5	100

Table 2 above shows that patients with all severity of URTI had completed immunization record. From five patients with severe URTI, three patients (60%) had completed immunization record.

Table 3. Distribution of Severity of URTI Based on Parent's Income.

Parent's income	Severity of URTI					
	Mild		Moderate		Severe	
	f	%	f	%	f	%
Low	2	13.3	2	7.7	2	40
Moderate	6	40	7	26.9	3	60
High	4	26.7	13	50	0	0
Very High	3	20	4	15.4	0	0
Total	15	100	26	100	5	100

Table 3 shows that most patients with mild URTI had moderate parent's income (40%), while patients with moderate URTI had high parent's income (50%). Patients with severe URTI had moderate parent's income (60%) with none of them had high or very high parent's income.

Table 4. Distribution of Severity of URTI Based on Type of CHD.

Type of CHD	Severity of URTI					
	Mild		Moderate		Severe	
	f	%	f	%	f	%
Cyanotic	2	13.3	2	7.7	0	0
Acyanotic	13	86.7	24	92.3	5	100
Total	15	100	26	100	5	100

Table 4 shows that most patients with all severity of URTI had acyanotic CHD. There were 86.7% patients with mild URTI had acyanotic CHD. There were 92.3% patients with moderate URTI and 100% patients with severe URTI had acyanotic CHD.

**Discussion**

In this research, the total number of patients who met the inclusion criteria was 46 people. There were 18 (39.1%) male patients and 28 (60.9%) female patients with a male to female ratio of 1:1.6. This is similar to a research conducted at Surabaya PHC Hospital which took sample of CHD patients and respiratory infections, the total number of female patients (53.2%) was the highest number of all patients<sup>8</sup>. This is the opposite of Muhammad Habibi Syahidia's research which stated that there were more male patients with respiratory tract infections (73.8%) than female patients (72.1%)<sup>9</sup>.

Gender is considered to affect the severity of infection disease for toddler. In this study, female had more severe respiratory infections (80%) than male. These results are in line with studies in mice on influenza viruses carried out by Molly A. Ingersoll in 2017 which stated that female sex had morbidity and mortality rates were higher than male sex. This is due to an increase in cytokines, such as Tumor Necrosis Factor (TNF) - $\alpha$  and C-C chemokine ligand 2 (CCL2) motifs in women<sup>10</sup>. However, in the study of Anak Agung Anom Sukamawa (2006), it was stated that gender is not a factor that influences the incidence of respiratory infections in children under five years old<sup>11</sup>.

The age group of the majority patients with CHD with URTI was toddler as many as 69.6%. This result is similar to the study conducted by Rocky Wilar and J. M. Wantania which stated that 26 of 47 patients were toddlers<sup>5</sup>. According to Duppenenthaler *et al.* (2014) and Boyce *et al.* (2000), children with CHD are susceptible to respiratory tract infections especially in their first year<sup>12, 13</sup>. According to Brook (2012) and Cabalca (2004), this may be related to immune status and small airway size in younger children<sup>14, 15</sup>.

In this study, 72% of CHD patients with URTI had a history of complete immunization according to age. This is similar to the research conducted in Puskesmas Kelurahan

Tebet Barat, DKI Jakarta which stated that 60 out of 104 patients with respiratory infections have a history of complete basic immunization<sup>9</sup>.

Immunization can stimulate the immunity so that the baby can be protected from several dangerous diseases. Immunization in children such as diphtheria, pertussis, and measles immunization can prevent deaths caused by respiratory infections. Children are encouraged to get complete immunization so that the progression of the disease will not become more severe<sup>16</sup>. However, in this study patients with mild, moderate, and severe respiratory tract infections had complete immunization. This is contrary to research conducted in the population of the United States which stated that annual infection immunization such as influenza immunization can alleviate the morbidity of URTI<sup>17</sup>. This difference can be caused by many other factors that can cause the severity of infection, such as nutritional status, low birth weight, and so on.

Apart from the above factors, there are some uniqueness in this study, specifically the income of the patients' parents is mostly classified as high income. The number of patients with severe infections is greater in patients with low parent's income (40%) than patients with high parent's income (0%). The same thing was also obtained from the study of Anak Agung Anom Sukamawa (2006) which stated that the risk for the occurrence of Acute Respiratory Infection (ARI) in children under five years old who had less income was 0.245 times greater than the families of children with high income. Parent's income can affect behavior related to hygiene and health<sup>11</sup>. For example, low-income parents tend not to seek immediate treatment if their child is sick so that the disease becomes more severe over time.

However, it is also possible if high-income parents have children with severe respiratory tract infections. This difference can be caused by other factors that play a role, such as low education levels.

Differences in exposure and susceptibility to infection are one mechanism that can be associated with social factors in shaping health status in individuals. Early exposure to infection will be an important factor in infectious diseases in children. Children with low family income will be more often exposed to infectious diseases, such as cigarette smoke, poor nutrition, stress, etc<sup>18</sup>. This will make the children exposed to antibodies earlier than children with high family income. Children with low family income can have better immunity due to exposure to previous infectious agents.

According to the research conducted at Karachi Hospital and Aga Khan University in October to December 20212, many high-income families received no notification of vaccination. This unconsciousness to visit health centers to get vaccinations is the most frequent reason to not getting vaccinations<sup>19</sup>. Children who have not received previous vaccinations will certainly be more vulnerable to disease, including infectious diseases.

In this study, the highest number of CHD patients in URTI was acyanotic PJB (89.1%), followed by cyanotic PJB (10.9%). This is similar to the study of Rocky Wilar and J. M. Wantania in 2006 which stated that acyanotic PJB

patients were 61.7% while cyanotic PJB patients were 38.3%<sup>9</sup>.

In this study, severe URTI only occurs in acyanotic CHD. Different results were obtained from research in Manado in 2006 which stated that the severity of respiratory tract infections in cyanotic CHD was higher, 15-16 times/year than acyanotic PJB, 9-10 times/year<sup>9</sup>. According to Keith L Moore (2014), acyanotic CHD causes pulmonary hypertension which leads to compression of the large bronchi by the left atrium or enlarged pulmonary artery, so that the lungs become hyperperfused and experience edema. In addition, the respiratory pathway becomes hypoplastic and there is impaired perfusion ventilation. The things above will cause airway mucosal damage and impaired immunity which will increase the risk of respiratory infections<sup>20</sup>.

## Conclusion

Female patients had more (80%) severe URI than male patients. Patients with severe URI only occur in toddlers. Interestingly, 60% of patients with severe URI had complete immunization. Patients with severe URI had parents with moderate (60%) and low income (40%). There were 100% of patients with severe URI who had acyanotic CHD.

## CONFLICT OF INTEREST

The author stated there is no conflict of interest in this study.

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