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Prompt Identification of Congenital Heart Disease by Echocardiographic Screening

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ABSTRACT

Congenital cardiac disease is the most prevalent congenital condition responsible for the highest mortality rate. Insufficient information among healthcare professionals hinders preventative and early detection efforts. We must implement educational initiatives designed to enhance the expertise of healthcare professionals in early identification and intervention. This initiative encompasses webinar training and echocardiography screening conducted with healthcare professionals in Kediri. We evaluated the participant's knowledge through a pre-test and post-test. A consultant pediatrician does an echocardiography screening next. A total of 451 participants attended the webinar. The mean pre-test score is 5.80 out of 15, whereas the mean post-test score is 12.84 out of 15. A total of 29 children underwent echocardiographic examination. Nineteen (65.52%) children were diagnosed with Asiatic congenital heart disease, four (13.79%) with cyanotic conditions, and six (20.68%) were classified as normal. Webinar training enhances health workers' understanding of early detection, with 79.31% of children undergoing echocardiography screening receiving a diagnosis.

Keywords: Pediatrics; Echocardiography; Congenital Heart Disease; Screening

INTRODUCTION

The most common Congenital Disease found in newborns is Congenital Heart Disease. The incidence rate of cases is quite high in developing countries such as Asia and Africa, but low in developed countries. The incidence rate has been fairly stable over the past 3 decades, indicating that there has been little progress in prevention efforts and demonstrating the importance of studying the etiology of the disease. CHD is defined as a structural abnormality in the heart and/or large blood vessels that arises from birth and has the potential to interfere with the function and work of these organs (Yoon et al., 2020). However,

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Congenital Arrhythmias and Cardiomyopathy are not included in CHD, although the disorder is caused by genetic factors that appear at birth Various studies have been conducted to determine the etiology of the disease, but only 15% of cases of CHD are known to cause it. Rapid developments in the cardiovascular and surgical fields over the past few decades have drastically reduced mortality and most patients are able to reach adulthood, but CHD is still the leading cause of death resulting from congenital disorders (Willim & Supit, 2021).

The incidence of death due to CHD is 81 cases per 100,000 live births. The mortality rate caused by Critical Congenital Heart Disease was 64.7%, with a mortality rate of 12.0%. The survival rate at 28 days decreased by almost 70% in babies born with CHD. Limited knowledge among health workers about the etiology of CHD and the high heterogeneity in the CHD epidemic are major barriers to prevention and early detection. To address this problem, educational activities focused on early detection and management of CHD, especially in primary health facilities in Kediri, need to be carried out. This activity includes education for health workers and echocardiography screening. In addition, visits are also carried out with the aim of checking all newborns who are treated in the neonatal intensive care unit (NICU) to detect CHD before the patient is discharged from the hospital. The benefits of pulse oximetry in detecting CHD were also evaluated during this activity (Wright et al., 2014).

RESEARCH ELABORATIONS

The activities carried out involve two types of activities, namely webinar training and echocardiography screening. The research subjects for the webinar training are all health workers, including general practitioners, pediatricians, midwives, nurses, and medical students from various fields in Kediri. The research was sampled with total sampling. The training was conducted through webinars with public lectures, educational videos, and question and answer sessions held via Zoom Meeting on Saturday, starting at 9 am. To attract participants, the first 100 registrants are given free credit vouchers. The webinar topics focused on how to detect, manage, diagnose, and treat CHD early, as well as case simulation. The level of knowledge of health workers was assessed using a pre-test and post-test consisting of 15 multiple-choice questions, and the results were statistically analyzed using a t-test. Echocardiography screening visits and pulse oximetry examinations of newborns by Consultant Pediatricians are carried out.

RESULTS AND DISCUSSIONS

Health Education is carried out online through a free webinar for health workers in Kediri with a topic that focuses on early detection of childhood CHD. This webinar was attended by

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130 participants consisting of 30 General Practitioners (23.07%), 30 Pediatricians (23.07%), 39 nurses (30%), 31 Midwives (23.86%) (Table 1). This webinar was delivered in various forms, namely seminars, educational videos, and question and answer sessions by Pediatric Cardiologists. The seminar material consists of detection, management, diagnosis, therapy and simulation of CHD cases [1

Table 1. Participants

Profession	Participants	%
General practitioner	30	23.07
Specialist	30	23.07
Nurse	39	30
Midwife	31	23.86
Total	130	100

Source: Observations, discussions, and interviews

Before the seminar started, participants were given a pre-test with 15 multiple-choice questions. The average pre-test score was 5.80/15 and none of the participants got a perfect score. As for the average post-test score was 12.85/15 with 133 (29.50%) participants getting perfect scores. Comparison of test results with t-test showed significant differences ($p < 0.05$) (Table 2)

Table 2. Pre- and post-test results

Test	Average score	P
Pre-test	5.80	0.001
Post-test	12.85	

Source: results

During the visit in 2024, a total of 29 children (52% male and 48% female) underwent echocardiography screening examinations conducted by 3 Pediatric Cardiologists. There were 19 (65.52%) children diagnosed with Asianotic CHD, 4 (13.79%) children with cyanotic CHD and 6 (20.68%) normal children. Ventricle septal defect (VSD) was the most common lesion found in children (27.58%) followed by atrial septal defect (ASD) at 20.68% and persistent ductus arteriosus (PDA) at 13.79% in asianotic CHD. Meanwhile, in cyanotic CHD, the most cases were Tetralogy of Fallot (TOF) at 7%, followed by Transposition of the Great Artery (TGA) at 3.5%. The majority of children showed recurrent symptoms of ISPA (34.48%). For nutritional status, as many as 42% are classified as moderate malnutrition. As for prenatal history, the majority of participants were born spontaneously (76%) aterm (75%)

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Over the past 80 years, there have been significant advances in the diagnosis and treatment of CHD. In the Metropolitan Atlanta Congenital Defects Program, the survival rate of infants with critical CHD increased from 67.4% for the 1979-93 birth cohort to 82.5% for the 1994-2005 cohort. Despite progress in developed countries, this is not the same as in developing countries, where CHD is still the leading cause of newborn death. CHD is the cause of 6%-10% of newborn deaths and as many as 20%-40% of newborn deaths occur due to malformations. The main reason for the high morbidity and mortality rates in newborns is the clinical deterioration and collapse that occurs before the patient is diagnosed, diagnosed, and treated with radiation (Menahem et al., 2021). CHD can result in significant hemodynamic problems and potentially in critical conditions that require intervention and surgery.

As many as 25% of CHD cases are life-threatening and clinical manifestations can appear before the first routine check-up. If this critical condition is not identified soon after birth, it will result in a delay in referral that increases morbidity and mortality rates. Therefore, health workers are very important to know how to identify CHD cases early, especially in primary health facilities where adequate human resources and diagnostic tools are still limited (Peterson et al., 2014). The COVID-19 pandemic has shown that education and training are provided online. The transition to online learning methods is happening very quickly in several countries and is carried out with various platforms such as ZOOM and Google Meet to support the educational process. Health workers have an obligation to develop and improve knowledge and skills on an ongoing basis so that they can provide good medical services. Online seminars are one of the popular alternative methods to increase the knowledge of health workers during the pandemic. However, this has limitations, especially in improving skills. Statistics show that this can significantly increase the knowledge of health workers.

Online seminars can accommodate many participants and can reach remote areas in Indonesia. During this pandemic, it is the right time to develop the necessary educational methods, strengthen the internet network in remote areas of Indonesia, and develop a learning model in the form of interesting and interactive medical skills video tutorials. It is expected that there will be a continuous education model managed with a communication model and consultation with experts in the field using available information technology to apply the knowledge gained in health services in the field .

This online seminar activity received excellent appreciation from the participants as they rarely got material like this before even though they claimed that such cases were very frequent. Knowledge about early detection and management of CHD is indispensable for health services. Therefore, the online method can be an alternative educational method to increase knowledge in the pandemic era that limits social interaction widely and openly From the echocardiography screening examination in Kediri, Ventricle septal defect (VSD) was the most lesion found

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(27.58%) followed by atrial septal defect (ASD) 20.68%, and persistent ductus arteriosus (PDA) 13.79% for asianotic CHD, and Tetralogy of Fallot (TOF) 7% for cyanotic CHD. This result is in accordance with Thomford et al in 2020 who stated that the most lesions in CHD cases are VSD which has a percentage of 31.4% while TOF is the most lesion in cyanotic CHD (25.5%). [9] The majority of children show failure in growth and development. For nutritional status, the majority experienced moderate malnutrition (41.38%). The results we found were similar to those of Diao's et al, which showed that patients with CHD had high levels of pre-operative malnutrition and some showed improvement in nutrition after surgery. [10] Data from this activity can be used as a basis for the management of malnutrition in children with.

CONCLUSIONS

The incidence rate of CHD is very high in developing countries, including Indonesia. Lack of knowledge among health workers about the etiology, risk factors and high heterogeneity in CHD is the main obstacle in prevention and early detection. The implementation of webinars can be an alternative method to increase knowledge about CHD in health workers. Ventricle septal defect (VSD) is the most common lesion in asianotic CHD and Tetralogy of Fallot (TOF) is the most common lesion in cyanotic CHD.

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