

Impact of Online Eating Behavior Changes on Nutritional Status of Elementary School during Pandemic

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ABSTRACT

Introduction: COVID-19 pandemic has had a huge impact on education in Indonesia necessitating distance learning from home via online methods. Learning from home change people's daily life including eating behavior. Children's eating behavior plays an important role in their nutritional status.

Methods: We conducted an observational study with a cross-sectional design which included 48 subjects. Data were collected using an online structured questionnaire.

Results: The results of the relationship test show a p-value of (0.000) which is smaller than alpha (0.05). The comparison test results show a p-value of (0.000) which is smaller than (0.05).

Conclusion: There is an association of changed eating behavior during COVID-19 pandemic with children's nutritional status.

Keywords: COVID-19; eating behavior; nutritional status; online learning



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Introduction

Indonesia faces a dual burden of malnutrition, with high rates of undernutrition and rising obesity. WHO defines malnutrition as a medical condition caused by inadequate or imbalanced intake or supply of nutrition. Malnutrition is more often associated with insufficient nutrient intake and excessive nutrient intake.¹

The prevalence of nutritional status (IMT/U) according to the 2018 National Riskesdas data report for children aged 5-12 years is as follows: Very thin cases 24%, thin 6.8%, normal 70.8%, overweight 10.8%, and obese 9.2%.⁽²⁾ In South Sulawesi, the prevalence of nutritional status for children aged 5-12 years in urban areas is as follows: Very thin 3.89%, thin 8.61%, normal 69.40%, overweight 8.92%, and obese 9.18%. In rural areas, the prevalence is as follows: Very thin 2.32%, thin 8.67%, normal 77.30%, overweight 7.05%, and obese 4.66%. From these data, it can be seen that urban areas have a much higher risk of obesity than rural areas in South Sulawesi Province. The highest incidence of obesity in Makassar City ranks first with a prevalence of 11.82. The incidence of obesity in boys is higher than in girls with a prevalence of 7.74% and 5.27%, respectively.³

Eating behavior is the most important behavioral state that can influence nutritional quality. In general, the eating behavior of elementary school children is influenced by parents and schools, which will shape the eating behavior of children.⁴ School-age children need good nutrition from their parents and from their environment. If the nutrients they receive are not complete, it will affect physical growth, structure, and decreased brain function, which will cause lack of attention and concentration in learning, and behavioral deviations.⁵

The COVID-19 pandemic was first identified in Wuhan, Hubei, China, on December 1, 2019. The virus spread rapidly to the rest of the world, including Indonesia. WHO declared a COVID-19. On March 3, 2020, Indonesia first reported a COVID-19 case. Indonesia's government issued a policy to maintain social distancing at the community level and avoid crowds, which also affected learning at the elementary and secondary school levels. As a result, schools in Indonesia, specifically in Makassar City, had to be closed and switched to online learning. This was done by the government as one of the anticipations of the impact of the pandemic to break the chain of distribution of COVID-19 in Indonesia.

During the COVID-19 pandemic, Indonesians experienced a change in eating habits by 62.5 %, an increase in food consumption diversity by 59 %, an increase in eating frequency by 54.5 %, an increase in the amount of food consumed by 51 %, and an increase in body weight by 54.5 %.⁶ Several studies have shown that changes in eating behavior and physical activity occur when people spend more time at home. These changes include a decrease in physical activity (38.0 %) and an increase in sitting time (28.6 %), an increase in the frequency of eating and snacking, and consumption of unhealthy foods, compared

to before the COVID-19 pandemic.⁷

Based on the above, the researchers were interested in conducting a study to analyze the changes in eating behavior during online learning on the nutritional status of elementary school-aged children during the COVID-19 pandemic at SD. Inp. Todopuli 1 Kota Makassar.

Methods

The study design used in this study is an observational analytic with a cross-sectional research approach. This study was conducted to determine the relationship between eating behavior and nutritional status of elementary school-aged children during online learning during the COVID-19 pandemic. The study was conducted at SD. Inp. Todopuli 1 Makassar City from June to July on 2021. The population in this study was all grade 4 students and parents (mothers) who attended SD. Inp. Todopuli 1, a total of 92 students. The number of samples was 48 samples. This study was by using purposive sampling technique that had met the inclusion and exclusion criteria.

The data used in this study were primary data obtained from respondents. The questionnaire was distributed to respondents through *Google forms*, then the respondents filled out the *Google forms* with the assistance of the researchers. Data were processed using the SPSS (Statistical Package for the Social Sciences) program, using univariate analysis to determine the frequency distribution of the variables studied. Bivariate analysis using the Person *Chi-square* test to see the relationship between eating behavior and the nutritional status of children during online learning and using *the Man-Whitney-U* test to see the comparison of children's eating behavior before and during online learning during Covid- 19 pandemic.

Result

Univariate Analysis

1. Characteristics of respondents based on child gender

Table 1 Distribution of respondent characteristics based on the gender of class 4 elementary school children at SD Inp. Todopuli 1 Makassar City in 2021

Variable	Frequency	%
Gender		
Man	25	52,1
Women	23	47,9
Total	48	100

Source: Primary Data

The results of the study showed that the number of male respondents was 25 (52.1%), which was higher than the number of female respondents, which was 23 (47.9%)

2. Characteristics of respondents based on child nutritional status during online learning

Table 2. Distribution of respondent characteristics based on nutritional status of class 4 elementary school childrens at SD Inp. Todopuli 1 Makassar City in 2021

Variable	Frequency	%
Nutritional Status		
Malnutrition	4	8,3
Under nutrition	5	10,4
Good Nutrition	36	75
Over nutrition	3	6,3
Total	48	100

Source: Primary Data

Based on the results of the study, respondents with good nutritional status had the highest frequency of 36 respondents (75%), while the lowest frequency was in the overweight status of 3 respondents (6.3%).

3. Characteristics of respondents based on child eating behavior before online learning

Table 3. Distribution of respondent characteristic based on child eating behavior before online learning.

Variable	Frequency	%
Dietary Pattern		
Very Poor	3	6,25
Poor	5	10,42
Moderate	14	29,17
Good	14	29,17
Very Good	12	25,00
Total	48	100

Source: Primary Data

Based on the results of the study, moderate and good eating patterns were applied to 14 respondents (29.7%), 12 respondents (25%) with a very good eating pattern, 5 respondents (10.42%) with a bad eating pattern, while others there were 3 respondents (6.25%) with a very bad eating pattern.

4. Characteristics of respondents based on child eating behavior during online learning

Table 4. Distribution of respondent characteristics based on child eating behavior during online learning.

Variable	Frequency	%
Dietary Pattern		
Very Poor	1	2,1
Poor	4	8,3
Moderate	11	22,9
Good	23	47,9
Very Good	9	18,8
Total	48	100

Source: Primary Data

Based on the results of the study, it was found that a good eating pattern was applied to 23 respondents (47.9%), 11 respondents (22.9%) with a moderate eating pattern, 9 respondents (18.8%) with a very good eating pattern, 4 respondents (8.3%) with a bad eating pattern, while others there was 1 respondent (2.1%) with a very bad eating pattern.

5. Characteristic of respondent based on parents' education

Table 5. Distribution of respondent characteristics based on parents' education of class 4 elementary school children at SD Inp. Todopuli 1 Makassar City in 2021

Variable	Frequency	%
Education		
Diploma	6	12,5
bachelor	26	54,2
Senior high school	14	29,2
junior high school	2	4,2
Total	48	100

Source: Primary Data

The results of the study, the highest educational level of the respondents was with a S1 education of 26 respondents (54.2%), while the lowest frequency was at the SMP level of 2 respondents (4.2%).

6. Characteristics of respondents based on parents' occupation

Table 6 Distribution of respondent characteristics based on parents' occupation of class 4 elementary school children at SD Inp. Todopuli 1 Makassar City in 2021

Variable	Frequency	%
Occupation		
housewife	26	54,2

Other	1	2,1
Civil Servant	10	20,8
Private Employee	4	8,3
Student/University Student	1	2,1
Entrepreneur	6	12,5
Total	48	100

Source: Primary Data

The results of the study, the most dominant type of work for respondent is housewife as many as 26 people (54.2%), civil servants there are 10 respondents (20.8%), private employees 4 respondents (8.3%), entrepreneurs 6 respondents (12.5%), students/students 1 respondents (2.1%), and others as many as 1 respondents (2.1%).

Bivariate Analysis

1. Relationship between eating habits and child nutritional status before online learning

Table 7. Distribution of the Relationship Between Eating Habits Before Online Learning and the Nutritional Status of Class 4 Elementary School Children at SD Inp. Todopuli 1 Makassar City in 2021

Dietary pattern before pandemic	Nutritional Status								Total	p-value	
	Very Poor		Poor		Good		Overweight				
	F	%	F	%	F	%	F	%			
Very Poor	0	0.00%	0	0.00%	2	4.17%	1	2.08%	3	6.25%	0.625
Poor	1	2.08%	0	0.00%	4	8.33%	0	0.00%	5	10.42%	
Moderate	0	0.00%	1	2.08%	12	25.00%	1	2.08%	14	29.17%	
Good	1	2.08%	2	4.17%	10	20.83%	1	2.08%	14	29.17%	
Very Good	2	4.17%	2	4.17%	8	16.67%	0	0.00%	12	25.00%	
Total	4	8.33%	5	10.42%	36	75.00%	3	6.25%	48	100%	

Source: Primary Data

The results of the relationship test showed a p-value of 0.625, which is greater than alpha 5 % or 0.05, so H0 is accepted and H1 is rejected. This can be concluded that there is no significant relationship between eating habits before the pandemic and the nutritional status of the respondents.

2. Relationship between eating habits and child nutritional status during online learning

Table 8. Distribution of the relationship between eating habits during online learning and the nutritional status of class 4 elementary school children at SD inp. todopuli 1 Makassar city in 2021

Dietary pattern during pandemic	Nutritional Status								Total	p-value	
	Very Poor		Poor		Good		Overweight				
	F	%	F	%	F	%	F	%			
Very Poor	0	0,00	0	0,00	0	0,00	1	2,08	1	2,08	0,000
Poor	1	2,08	2	4,17	1	2,08	0	0,00	4	8,33	
Moderate	3	6,25	2	4,17	6	12,50	0	0,00	11	22,92	
Good	0	0,00	1	2,08	21	43,75	1	2,08	23	47,92	
Very Good	0	0,00	0	0,00	8	16,67	1	2,08	9	18,75	
Total	4	8,33	5	10,42	36	75,00	3	6,25	48	100,00	

Source: Primary Data

Results of the relationship test showed a p-value of 0.000, which is less than alpha 5% or 0.05, so H0 is rejected and H1 is accepted. This can be concluded that there is a significant relationship between eating habits during the pandemic and the nutritional status of the respondents.

3. Comparison of eating behavior before and during online learning

Table 9. Distribution of the comparison of eating behavior before and during online learning for elementary school children in class 4 at sd inp. todopuli 1 makassar city in 2021

before pandemic - during online learning	Paired Differences					p-value
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		
				Lower	Upper	
	-28.125	20.851	3.010	-34.179	-22.071	0.000

Source: Primary Data

The results show that the average difference between before and during online learning is -28.125 with a standard deviation of 20.851, and the difference is between -34.179 and -22.071. The results of the comparison test showed a p-value of 0.000, which is less than 0.05, so it is concluded that there is a significant difference in the average between before and during online learning.

Discussion

Diet means a habit of eating about the consumption of food in the form of staple foods, protein sources, vegetables, fruits, and milk. The consumption pattern applied to children is high-energy food but low in fiber.⁸ During the current pandemic, families tend to improve their nutritious eating patterns compared to before the pandemic. Several studies on eating behavior, show that there are changes in food consumption patterns during the COVID-19 pandemic, where people consume more processed grain, fruit, and milk products.⁹

Based on the research results in table4, it was found that based on a good eating pattern during online learning, there was 1 respondent with a nutritional status of less than normal, 21 respondents with a nutritional status of normal, and 1 respondent with a nutritional status at risk of overweight. This shows that the eating behavior and nutritional status of grade 4 students are mostly good. The research results obtained are in line with previous research by Aris et al., where it was found that the nutrition of children aged 3-5 years during the COVID-19 pandemic is within normal limits and parental knowledge about the nutrition of children aged 3-5 years during the COVID-19 pandemic is mostly in a good condition.¹⁰

Eating behavior is closely related to children's eating habit and how parents feed their children to meet their daily nutritional needs. Table 6 shows that the most dominant type of mother's occupation is housewife, with 26 people, and for civil servants or private employees, there are 14 people, including 10 civil servants, 4 private employees, and 6 entrepreneurs. This shows that most of the respondents are housewives, where mothers can monitor their children's eating behavior and accompany their children during online learning.

Based on the results of this research, the highest level of education for parents was a bachelor's degree for 26 people, while 2 respondents had a junior high school education. Determining the menu to provide and feed the family is influenced by education, employment and family income. Mothers who have high knowledge without being accompanied by knowledge about good nutrition will have an impact on their ability to provide food by the balanced nutritional guidelines required by the family.¹¹ Research conducted by Dody, 2017 shows that there is a significant relationship between maternal knowledge and parenting patterns and there is a significant relationship between parenting patterns and children's nutritional status.

¹²

A study conducted by Katri Andini et al., 2021 to examine the factors that influence of the eating patterns of elementary school students found that the mother's factors, including age, education, knowledge, employment status, and feeding practices, had a significant impact on the eating patterns of elementary

school students. This is because mothers play a key role in providing menus, selecting food ingredients, choosing menus, processing food, and determining food consumption patterns, which ultimately shape the eating habits of families and children. As the key role-holder, mothers are advised to educate their children about the importance of healthy eating for the human body so that children can adopt the habit of eating foods that should be consumed and those that should not be consumed at school or play so that children do not consume unhealthy snacks.¹¹

The results of the study showed that 36 students had a good nutritional status, while 3 students had a risk of being overweight. Based on the results above, it can be concluded that the 4th grade students at SDN Inp. Toddopuli 1 have a good nutritional status during the pandemic compared to their nutritional status before the COVID-19 pandemic. Good nutritional status will have a positive impact on the learning process, as malnutrition can disrupt concentration at school or at home, which can affect academic achievement.

Based on Table 10, the results of the study showed that there was a significant difference in the average behavior of children's eating before and during online learning. This is in line with previous studies that stated that there were changes in eating habits during the COVID-19 pandemic. Disruption of daily routines due to quarantine lead to boredom, which is then associated with increased energy intake. In addition to boredom, hearing or constantly reading COVID-19 news from the media can cause stress. Stress leads subjects to overeating, especially foods that contain sugar or are rich in carbohydrates, which can reduce stress by promoting the production of serotonin, which has a positive effect on mood. However, the effect of the desire to eat carbohydrate-rich foods is comparable to the glycemic index of foods, which is associated with an increased risk of obesity and cardiovascular disease, chronic inflammation, and an increased risk of more severe complications. This new condition can disrupt healthy and varied eating patterns, as well as regular physical activity. However, this is different from the study conducted by Fadliana (2021), which showed that there was no significant difference between eating patterns before and after the home learning policy.¹³

In Amaliyah's (2021) the eating patterns of adolescents during the COVID19 pandemic, it showed that there was awareness in the behavior of consuming food according to the three time divisions (morning, afternoon, and evening). Adolescents try to always enjoy the main meal on time with a balanced diet consisting of carbohydrates, protein, fat, vitamins, and minerals. This was done by most respondents because they fully understood the importance of maintaining body immunity during the pandemic. The types of main meals consumed daily are mostly from homemade dishes, although on some occasions it is not impossible to buy fast food. In addition to the main meal, the adolescents' eating patterns also consume

snacks or snacks during the COVID-19 pandemic to prevent boredom. While the types of snacks that are often consumed are salty snacks such as chips and fried foods.^{14,15}

Conclusion

Based on the results of a study conducted to determine how changes in eating behavior before online learning was poor, such as frequent consumption of snacks sold at school and mothers who were not paying attention to the nutritional intake of their children because they tended to consume fast food or processed food. During online learning was good because mothers were more attentive to their children's food and mothers were more likely to cook their own food because of the Covid-19 pandemic to prevent the spread of Covid-19. The nutritional status during online learning had a higher percentage of good nutritional status. Then, there was a significant relationship between eating behavior before the pandemic and during online learning in students.

Conflicts of Interest

There is no conflict of interest

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The Effect of Passive Smoking during Pregnancy on Low Birth Weight

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ABSTRACT

Introduction: A newborn who weighs less than 2,500 grams at delivery is considered low birth weight (LBW). There are many factors that can influence the determinants of LBW. One of the multifactorial is pre-natal exposure to tobacco smoke from the partner or environment in pregnant women (passive smokers) which provides negative effects for both the mother and the fetus. This study aims to determine the relationship between passive smoking during pregnancy and LBW at RSUD H. PadjonganDg. Ngalle Takalar in 2019.

Methods: The research is an observational analysis with a case-control approach. The population in this study is all mothers who gave birth to babies in the delivery room at RSUD H. PadjonganDg. Ngalle Takalar had 139 mothers who gave birth from January to December 2019. The sampling technique in this study used the purposive sampling

Results: The results showed the pregnant woman's environment who was most often exposed to cigarette smoke with LBW (<0.05), Cigarette smoke exposure in the home with LBW (<0.05), Cigarette smoke exposure in the outdoor environment with LBW (<0.05), Pregnant women who were exposed to cigarette smoke in one week with LBW (<0.05), Frequency of time pregnant women were exposed to cigarette smoke in one day with LBW (<0.05).

Conclusion: There is a significant relationship between passive smoking during pregnancy and low birth weight (LBW).

Keywords: Passive smoking; pregnancy; low birth weight

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Introduction

A newborn who have weight less than 2,500 grams at delivery is considered low birth weight (LBW). Between 60% and 80% of all newborn deaths are attributable to LBW, which is an indirect cause. 20 million LBW kids are born annually, or 15.5% of all LBW babies worldwide. 96,5 % of them are in underdeveloped nations.¹

According to the 2016 district/city profile, South Sulawesi province showed a total of 148.7140 live births, 123.702 live births weighed, with 5,299 LBW cases (4.28%). The highest was in Makassar City with 690 cases, Gowa Regency (342 cases), Luwu Regency (288 cases), and the lowest cases were in Barru Regency (27 cases), Bantaeng Regency (47 cases), and Tana Toraja Regency (65 cases). The pattern of causes of infant deaths (neonatal and post-neonatal) in Takalar Regency from 2010 to 2015 was most caused by LBW, namely 33 cases.^{2,3}

There are many factors that can influence LBW, including demographic factors such as maternal age, abortion history, lifestyle, health care, environment, work, noise, violence, and maternal trauma. In addition, there are nutritional factors, including protein intake, iron, and some micronutrients, and infectious factors, including urinary tract infections and other infectious diseases during pregnancy. One of the important factors among these multi-factors is prenatal exposure to cigarette smoke from the partner or environment in pregnant women (passive smokers) which has negative effects for both the mother and her fetus.⁴ Pregnancy-related smoking raises the risk of low birth weight by 20–30%. It also states that low birth weight is associated with an increased risk of infant mortality, respiratory problems, and other health problems.⁵ WHO states that maternal smoking is the main preventable cause of low birth weight, and accounts for approximately 20% of cases of low birth weight worldwide.⁶

Exposure to cigarette smoke to vulnerable groups such as pregnant women and babies is a problem that is quite difficult to avoid in developing countries like Indonesia. It does not only affect the health of smokers but also affects people who inhale the smoke (passive smokers), such as pregnancy complications, LBW, and even infant death. When pregnant women smoke or are passive smokers who breathe in their spouses' tobacco smoke, the chemicals in cigarettes will enter the fetus through the placenta.⁷

Carbon monoxide is a gas produced by incomplete combustion of carbon-containing fuels, such as cigarettes. When *CO* is inhaled, it displaces oxygen in the blood, forming carboxyhemoglobin (*HbCO*). *HbCO* is unable to transport oxygen to the body's tissues, including the developing fetus.⁸ Low birth weight and fetal development restriction can result from *CO* exposure through a number of processes, which have been identified:

Reduced oxygen delivery to the fetus: *CO* binds to hemoglobin with a much higher affinity than oxygen, preventing oxygen from binding and being transported to the fetus. This reduction in oxygen supply can impair fetal growth and development.

Placental dysfunction: *CO* can damage the placenta, the organ that exchanges nutrients and oxygen between the mother and fetus. This damage can reduce the efficiency of nutrient and oxygen transfer, further contributing to fetal growth restriction.

Increased carboxyhemoglobin levels in the fetus: *CO* readily crosses the placenta and can accumulate in the fetal bloodstream, leading to elevated levels of *HbCO*. This further reduces the fetus's ability to transport oxygen and can lead to fetal hypoxia (oxygen deficiency).

Direct toxic effects on fetal tissues: The brain, heart, and lungs of a fetus can all be directly harmed by *CO*. These toxic effects can contribute to fetal growth restriction and developmental abnormalities.

Research has consistently shown that low birth weight and maternal *CO* exposure are strongly correlated. For example, a meta-analysis of 15 studies revealed a 12% increased risk of low birth weight (LBW) in pregnant women who were exposed to *CO*⁹. Another study found that the risk of LBW increased significantly with increasing levels of maternal *CO* exposure.¹⁰

This study at RSUD H. Padjonga Dg. Ngalle aims to ascertain the association between the status of passive smoking during pregnancy and Low Birth Weight.

Methods

Observational analytics using a case control methodology is the study methodology used. From January to March of 2021, this study was carried out at RSUD H. Padjonga Dg. Ngalle Takalar. All moms who gave birth in a delivery room between January and December 2019 (a total of 139 mothers) made up the study's population. Purposive sampling was the method employed for sampling in this investigation, and 60 samples were collected.

The first source of data used to collect the data was the medical records of women who gave birth to LBW children in RSUD H. Padjonga Dg. Ngalle Takalar in 2019. After that, using a questionnaire, interviews were done to determine the characteristics that were related to passive smoking during pregnancy and low birth weight in newborns. The Statistical for Social Science (SPSS) program was utilized for the data analysis in this study. Univariate analysis was employed to ascertain the characteristics of the respondents and sample. Subsequently, a bivariate analysis using the Chi-Square test was performed to ascertain whether LBW and passive smoking during pregnancy are related.

Result

Based on the results of the research and data processing that have been carried out, the following research results are presented:

Table 1. Frequency distribution of sample characteristics/research respondents:

Characteristics		n	%
Age	< 20 years	7	11.7
	20-35 years	36	60.0
	> 35 years	17	28.3
Work	Work	50	83.3
	Not Working	10	16.7
ANC	Regular	45	75.0
	Irregular	15	25.0
LBW	Light	52	86.7
	Medium	8	13.3
PP2	Home environment	50	83.3
	Work environment	10	16.7
PP3	Husband	50	83.3
	Other Family Members	10	16.7
PP4	Other People	8	13.3
	office	47	78.3
	Neighbors	5	8.3
PP5	>1 times	45	75.0
	1 times	15	25.0
PP6	>15 min	57	95.0
	<15 min	3	5.0
Total		60	100.0

The total respondents were 60. Based on Table 1, it is shown that 7 respondents (11.7%) were under 20 years old, 36 respondents (60%) were 20-35 years old, and 17 respondents (28.3%) were over 35 years old. Therefore, it is concluded that the highest frequency of respondents was in the 20-35 year age group. In addition, respondents who worked had the highest frequency of 50 respondents (83.3%), while the remaining 10 respondents (16.7%) did not work. The number of respondents with regular ANC was 45 respondents (75%) and 15 respondents (25%) with irregular ANC. In addition, respondents with mild LBW had the highest frequency of 52 respondents (86.7%), while the remaining 8 respondents (13.3%) had moderate LBW. The BBLR status variable of respondents with mild LBW had the highest frequency of 52 respondents (86.7%), while the remaining 8 respondents (13.3%) had moderate LBW.

The characteristics of the respondents PP2 (The environment of pregnant women who are most often exposed to cigarette smoke) were 50 respondents (83.3%) in the home environment and 10 respondents (16.7%) in the work environment. The characteristics of the respondents PP3 (The main source of exposure to cigarette smoke inside the house) were 50 respondents (83.3%) from their husbands and 10 respondents

(16.7%) from other family members. The characteristics of the respondents PP4 (The main source of exposure to cigarette smoke outside the home) were 8 respondents (13.3%) from other people, 47 respondents (78.3%) from work colleagues, and 5 respondents (8.3%) from neighbors. The characteristics of the respondents PP5 (Pregnant women who are exposed to cigarette smoke once a week) were 45 respondents (75%) in the >1 time category and 15 respondents (25%) in the 1 time category. The characteristics of the respondents PP6 (The frequency of time pregnant women are exposed to cigarette smoke in one day) were 57 respondents (95%) in the >15 minutes category and 3 respondents (5%) in the <15 minutes category.

Table 2. The relationship between the environment of pregnant women who are most often exposed to cigarette smoke and LBW

Variable			LBW		Total	P value
			Mild	Moderate		
PP2 The environment of pregnant women who are most often exposed to cigarette smoke	Home environment	n	46	4	50	0.021
		%	92.0%	8.0%	100.0%	
	Work environment	n	6	4	10	
		%	60.0%	40.0%	100.0%	
Total		n	52	8	60	
		%	86.7%	13.3%	100.0%	

*Chi-square test

The number of respondents for the variable PP2 (The environment of pregnant women who are most often exposed to cigarette smoke) is displayed in Table 2. The connection test's p-value of 0.021, which is below the 0.05 alpha threshold, was revealed. As a result, the alternative hypothesis, *H1*, is accepted and the null hypothesis, *H0*, is rejected. This indicates that the respondents' LBW and the variable PP2 have a significant correlation.

Table 3. The relationship between the main source of exposure to cigarette smoke in the home and LBW

Variable			LBW		Total	
			Mild	Moderate		
PP3 Main Source of Exposure to Cigarette Smoke in the Home and LBW	Husband	n	46	4	50	0.021
		%	92.0%	8.0%	100.0%	
	Other Family	n	6	4	10	
		%	60.0%	40.0%	100.0%	
Total		n	52	8	60	
		%	86.7%	13.3%	100.0%	

*Chi square test

The number of respondents for the variable PP3 (primary source of exposure to cigarette smoke in the home) is displayed in Table 3. The connection test's p-value of 0.021, which is below the 0.05 alpha threshold, was revealed. As a result, the alternative hypothesis, *H1*, is accepted and the null hypothesis, *H0*, is rejected. This indicates that the respondents' LBW and the variable PP3 have a significant correlation.

Table 4. The relationship between the main source of exposure to cigarette smoke in the outside environment and LBW

Variable			LBW		Total	p-Value
			Mild	Moderate		
PP4 Main Source of Exposure to Cigarette Smoke in the Outside Environment and LBW	Others	n	4	4	8	0.003
		%	50.0%	50.0%	100.0%	
	friends	n	44	3	47	
		%	93.6%	6.4%	100.0%	
	Neighbors	n	4	1	5	
		%	80.0%	20.0%	100.0%	
Total		n	52	8	60	
		%	86.7%	13.3%	100.0%	

*Chi-square test

The number of respondents for the variable PP4 (primary source of exposure to cigarette smoke in the outdoor environment) is displayed in Table 4. The connection test's p-value of 0.003, which is below the 0.05 alpha threshold, was revealed. As a result, the alternative hypothesis, *H1*, is accepted and the null hypothesis, *H0*, is rejected. This indicates that the respondents' LBW and the variable PP4 have a significant correlation.

Table 5. The relationship between the frequency of exposure to cigarette smoke in one week by pregnant women and LBW

Variable			LBW		Total	p-Value	
			Mild	Moderate			
PP5 frequency of exposure to cigarette smoke in one week by pregnant women and LBW	>1 times	n	42	3	45	0.019	
		%	93.3%	6.7%	100.0%		
	1 time	n	10	5	15		
		%	66.7%	33.3%	0.0%		
	Total		n	52	8		60
			%	86.7%	13.3%		100.0%

The number of respondents for the variable PP5 (pregnant women who are exposed to cigarette smoke in one week) is displayed in Table 5. The connection test's p-value of 0.019, which is below the 0.05 alpha

threshold, was revealed. As a result, the alternative hypothesis, *H1*, is accepted and the null hypothesis, *H0*, is rejected. This indicates that the respondents' LBW and the variable PP5 have a significant correlation.

Table 6: The relationship between the frequency of time pregnant women are exposed to cigarette smoke in one day and LBW.

Variable			LBQ		Total	p-value
			Mild	Moderate		
PP6 frequency of time pregnant women are exposed to cigarette smoke in one day and LBW	<15 min	n	1	2	3	0.044
		%	33.3%	66.7%	100.0%	
	>15 min	N	51	6	57	
		%	89.5%	10.5%	100.0%	
	Total	N	52	8	60	
		%	86.7%	13.3%	100.0%	

*Chi-square test

The number of respondents for the variable PP6 (frequency of time pregnant women are exposed to cigarette smoke in one day) is displayed in Table 6. The connection test's results revealed a p-value of 0.044, which is below the 0.05 alpha threshold. As a result, the alternative hypothesis, *H1*, is accepted and the null hypothesis, *H0*, is rejected. This indicates that the respondents' LBW and the variable PP6 have a significant correlation.

Discussion

Based on the data obtained from a study conducted at RSUD H. Padjonga Dg. Ngalle Takalar, it shows that most of the respondents in the case group were of a non-risk age group. Women under the age of 20 are four times more likely to give birth to a low-birth-weight (LBW) baby than women who give birth at a reproductive age. At the age of adolescence, the reproductive organs are still not mature, so the mother and fetus compete for nutrients. Pregnancy at the age of over 35 also has a higher risk of LBW birth due to the degeneration of the reproductive organs and hormonal imbalance. The inadequate function of the placenta also affects the production of progesterone and uterine irritability, causing changes in the cervix that can trigger premature birth.

Occupational factors can affect the incidence of LBW. In this study, occupation is one of the factors

that causes LBW. This is in line with the research by Zulardi (2014), where LBW occurred in 5.5% of pregnant women whose main work activities were done while standing, thus putting excessive strain on the uterus.¹¹ However, some studies show that working during pregnancy does not play a significant role in the birth weight of the baby. Routine prenatal check-ups (ANC) also affect the incidence of LBW. Pregnant women who do not routinely undergo ANC checks have a five-fold greater risk of giving birth to an LBW baby than pregnant women who routinely undergo ANC checks.⁹

The researcher assumed that passive smoking mothers who gave birth to LBW babies during pregnancy did not regularly check their pregnancies and their nutrition during pregnancy was not adequate. Insufficient nutrient intake during pregnancy can cause anemia in the baby which will affect the baby's weight.¹² The results of the chi-square test showed a significant relationship between the variables and the respondents' LBW. According to the study, the exposure of pregnant women to cigarette smoke at home came from their husbands, while exposure to cigarette smoke in the outside environment was from co-workers. The chemical content in passive smokers is higher than that in active smokers. Cigarette smoke can linger in a room for a long time, the toxins contained in cigarette smoke cling to clothing and furniture for several weeks. Respirable particulates become 3-12 times higher indoors.¹³ So in this study, a husband who smokes indoors tends to increase the risk of pregnant women being exposed to cigarette smoke, especially in the second trimester, the time when organ refinement takes place, so if exposed to cigarette smoke can cause pregnancy complications.

The results of the study showed that pregnant women were exposed to cigarette smoke for 15-60 minutes more than once a day. It can be concluded that there is a significant relationship between the PP6 variable and the BBLR of the respondents. The results of this study are in line with (Cheng, 2015), which aims to assess the distribution of nicotine reaching tissues and its ability to increase protein and DNA at certain exposure levels from a cigarette. Nicotine labels were found on the liver, lungs, testicles, brain, and placenta. The level of tissue damage is visible 15-60 minutes after exposure and decreases thereafter.¹⁴ The CDC states that "one in every five babies born to mothers who smoke during pregnancy has a low birth weight." The report also states that mothers who are exposed to cigarette smoke during pregnancy are more likely to have babies with low birth weight.¹⁵

Conclusion

Based on the results of a study conducted at RSUD H. Padjonga Dg. Ngalle Takalar, it can be concluded that pregnant women who are passive smokers can affect the birth weight of their babies. Education should be provided to husbands, families, and the surrounding environment about the dangers of cigarette smoke, which not only affects active smokers, but also passive smokers, namely pregnant women

and their fetuses. If necessary, signs prohibiting smoking can be placed in the work environment and encouragement to carry out smoking activities in separate rooms, especially not smoking near pregnant women. Further research on the side effects of cigarette smoke on the fetus with a representative sample size and a wider population is expected to reduce the incidence of LBW and other complications in infants.

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Occupational Noise Induced Hearing Loss in Motor Boat Fisherman

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ABSTRACT

Introduction: Noise Induced Hearing Loss is a person's hearing loss either partially or completely which is permanent and can affect one or both ears caused by continuous exposure to noise in the work environment. One of the causes of Noise Induced Hearing Loss (NIHL) is working as a motorboat fisherman.

Content: NIHL can arise as a result of the interaction between genetic factors and environmental factors with the role of internal and external risk factors. The diagnosis of NIHL can be established through history taking, physical examination such as otoscopy and tuning fork tests, as well as supporting examinations in the form of pure tone audiometry.

Conclusion: NIHL will produce the impression of sensorineural deafness with a permanent nature so that the only treatment that can be given is supportive and preventive management.

Keywords: Noisy; noise-induced hearing loss; motorboat fisherman



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Introduction

Noise-induced hearing loss is a hearing loss due to noise that exceeds the threshold value¹. Noise with an intensity of 85 decibels (dB) or more has the potential to cause damage to the auditory receptors of the organ of Corti in the inner ear. NIHL has symptoms that can be unilateral or bilateral. This disease can cause a lack of concentration, headaches due to disturbances in the nerves that regulate hearing function, difficulties in processing sound sources, sleep disturbances, the impact of job loss.^{1,2}

In general, NIHL can be caused by exposure to high and continuous noise associated with the work environment. Various types of work can result in noise exposure such as work in the industrial sector to fisherman. As an area that is rich in underwater natural potential, it is not uncommon for Indonesians, in especially coastal areas, to have a livelihood as fisherman. With this, it can increase the risk of the high incidence of NIHL in fisherman, especially those who still use motorboats. Therefore, it is very important for the community to understand NIHL so that they can take precautions to overcome this problem.

Definition

Noise Induced Hearing Loss (NIHL) or Occupational Noise Induced Hearing Loss is a person's hearing loss either partially or completely that is permanent and can affect one or both ears caused by continuous exposure to noise in the work environment. The NIHL incident has the principle that the higher the intensity and duration of noise exposure, the more severe the degree of NIHL caused. Hearing loss due to noise in the workplace can occur at noise intensities reaching 79 - 85 dB.³

Epidemiology

The incidence of NIHL in Indonesia is quite high. Indonesia's geographical location has a major influence on the incidence of NIHL because most of its territory is water so the number of people who work as fisherman is also large. There is a study conducted at the Ketapang-Gilimanuk crossing by examining pure tone audiometry, it was found that 34.85% of ship engine operators were deaf due to noise (NIHL). This study also said that workers who did work >40 hours/week experienced a 7.33 times greater risk of sensorineural hearing loss.⁴

Risk Factor

Several risk factors influence the incidence of *NIHL*, including noise intensity, frequency, length of exposure per day (increased if > 8 hours per day), years of service (increased if > 10 years), individual vulnerability, age (increased if > 50 years), gender (men have 3 times greater risk than women), and other risk factors. Based on the regulation of the minister of labor of the Republic of Indonesia, the noise

threshold value is 85 dB with an exposure time of 8 hours. At a noise value of 140, workers should not be exposed to noise at that value even for a short period of time. In the occurrence of NIHL, there are also internal and external risks for each individual who collaborates with noise exposure. Internal factors that influence include atherosclerosis, hypertension, middle ear disorders and the aging process while external factors include abnormal temperature, vibration, drugs, or ototoxic substances.^{2,5}

Etiology

Noise-induced hearing loss can be caused by a single exposure to a very high frequency such as an explosion, or it can also be caused by continuous exposure to noise at a relatively lower intensity over a long period, such as ferry operators, motorboat fisherman and other workers factory. The principle of the occurrence of NIHL is that the louder the noise exposure received, the shorter the time required for NIHL to occur.^{4,6}

Pathophysiology

NIHL can occur due to a combination of genetic and environmental factors. WHO recommends a relatively safe environmental noise level, which is below 70 dB for 24 hours or below 89 dB for more than five hours in a week. Noise exposure has different energy levels depending on the intensity and duration of sound exposure. According to JISA 2018, noise exposure on motorized boats has different levels depending on the type of engine, the speed of the boat, and the duration of the engine flame used. When the boat runs at a speed of 4 knots of 0.5 hours, the average noise value is 70 dB. If the boat is traveling at a speed of 8 knots and a duration of 4 hours has an average noise value of 73 dB (6-10)

Exposure to high energy levels of noise can cause a temporary increase in the hearing threshold. This condition can improve and return to normal within 24-48 hours. Although this can improve, it can cause damage to the hair cells in the ear even if it doesn't cause symptoms. If noise exposure occurs continuously. Then a temporary threshold increase can turn into a permanent one. Exposure to noise in the long term can cause damage to the ear and cause cell death. Excessive exposure to noise can also trigger psychological and physical stress such as increased blood pressure and increased pulse.^{7,10,11}

Clinical Manifestations

Clinically, exposure to noise in the hearing organ can cause an adaptation reaction, an increase in the hearing threshold that is temporary (temporary threshold shift) and an increase in the hearing threshold permanently (permanent threshold shift). Symptoms that can be found in NIHL include tinnitus (ringing in the ears), difficulty catching conversations (including difficulty communicating in crowded places), and decreased hearing.¹³

In addition to the effect on hearing (auditory), excessive noise exposure also has non-auditory effects such as difficulty in communicating, intellectual disturbances, sleep disturbances that can cause stress due to hearing loss.¹⁴

Diagnosis

The diagnosis of NIHL is based on history, physical examination and investigations.¹⁵ In the history, the patient can be asked about a history of working or working in an environment with exposure to high noise for a long time (> 5 years), a history of early onset of hearing loss (suddenly or slowly in one or both ears). In addition, patients are also asked whether hearing is lost in certain tones. After taking the history, it can be continued with a physical examination in the form of an otoscopy examination and a tuning or tuning fork test. The tuning fork test results in a positive Rinne, Weber lateralizes to the better-hearing ear and Schwabach shortens with the impression of sensorineural deafness. In addition, a supporting examination can also be carried out to confirm hearing by conducting an audiological evaluation. The audiological examination includes pure tone audiometry examination with air conduction (although it is subjective), pure tone audiometry examination with bone conduction, speech audiometry, and immittance. Pure tone audiometry examination found sensorineural deafness at frequencies of 3000-6000 Hz and at a frequency of 4000 Hz there is often a notch that is pathognomonic for this type of deafness.

Management

NIHL disease is permanent and progressive so that it rarely or even does not require medical therapy. The main strategy that can be done is to prevent the worsening of the patient's condition and carry out rehabilitation in people who have been exposed to NIHL.¹⁴ NIHL management must be done holistically and comprehensively.¹⁶

The simplest prevention that can be done is measuring noise. This procedure was carried out with the aim of assessing the maximum, average, minimum, intermittent type fluctuation and noise steadiness. The frequencies that are prone to causing damage to the organ of Corti in the cochlea are 3000 Hz - 8000 Hz. If exposure to high-intensity noise continues for a long time, it can cause hearing loss. After finding the source of the noise, this must be recorded and followed by measuring the time of exposure to noise. The higher the noise intensity, the relatively safe exposure time becomes shorter. This has been regulated in the Decree of the Minister of Manpower of the Republic of Indonesia no. KEP51/MEN/1999 concerning the threshold value of physical factors in the workplace. After taking the noise measurement, can be continued with noise control. This management can be done by minimizing the amount of noise at

noise sources such as noise reduction at the engineering control program stage (engineering control program), installation of silencers, engine insulation and sound-absorbing materials.¹⁶

Hearing examinations in workers with pure tone audiometry routinely can also be carried out to prevent the occurrence of NIHL. This examination consists of measuring the hearing function of employees before being accepted to work in a noisy environment (pre-employment hearing test), measuring the hearing function of employees during work, as well as people living in noisy environments. The hearing measurement process is carried out regularly and regularly every six months. It aims to get a basic picture of the hearing ability of workers and people in noisy environments. In the end, it will be known whether the place where the noise occurs can cause NIHL or even worsen the NIHL condition that has been suffered previously.¹⁶

Other treatments that can also be done are the use of simple protective equipment, such as earplugs and ear saddles as well as personal protective equipment (PPE). Apart from these ways, providing education to workers is the key to prevention. Before taking protective measures, a person must understand that they are at risk for NIHL and are obliged to take precautions. With this, it is very important to educate workers as an effort to prevent NIHL.¹⁸

After all the procedures have been carried out, the last step is recording all the processes that have been carried out. The purpose of recording is to evaluate the noise factor and determine the next step.¹⁶

Prognosis

NIHL is a disease with a type of cochlear sensorineural deafness that has a permanent nature and cannot be treated with drugs or surgery, so the prognosis is not good. Therefore, the most important thing is the prevention of NIHL.¹⁷

Conclusion

Noise induced hearing loss or occupational noise induced hearing loss is a person's hearing loss either partially or completely that is permanent and can affect one or both ears caused by continuous exposure to noise in the work environment. The incidence of NIHL is quite high in Indonesia, especially NIHL which affects motorboat fisherman. There are several risk factors for the emergence of NIHL including noise intensity, frequency, length of exposure per day, years of service, individual vulnerability, age, gender, and other internal and external risk factors. The basic pathophysiology of NIHL is a combination of genetic and environmental factors. The diagnosis of NIHL can be made by history taking, physical examination, and investigations. NIHL disease is permanent so that the treatment given is only supportive to prevent worsening and take precautions before getting NIHL. In this regard, NIHL disease has a dubia ad night prognosis.

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Complications of Diabetes Mellitus: A Review Article

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ABSTRACT

Introduction: Diabetes Mellitus is a chronic disease that will be suffered for a lifetime so the progressive disease will continue and can cause complications. Diabetes mellitus usually progresses slowly with symptoms that are mild to severe, and can even cause death due to acute or chronic complications..

Content: Hyperglycemic crisis is one of the acute complications that can occur in Diabetes mellitus, both type 1 and type 2. This situation is a serious complication that may occur even in well-controlled diabetes mellitus.

Conclusion: Diabetic ketoacidosis and hyperglycemic Hyperosmolar State are acute complications of Diabetes mellitus. Both of these complications can be triggered due to inadequate insulin therapy and the presence of infection. Diabetic ketoacidosis is a condition characterized by metabolic acidosis due to excessive formation of ketones, while a hyperglycemic hyperosmolar state is characterized by severe hyperosmolality with serum glucose levels which are usually higher than diabetic ketoacidosis.

Keywords: Complications; diabetes mellitus; diabetic ketoacidosis; hyperglycemic hyperosmolar state



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Introduction

Diabetes Mellitus (DM) is a chronic disease caused by metabolic disorders with clinical signs of increased blood sugar levels that exceed normal limits.¹ Indonesia is ranked seventh out of the 10 countries contributing to the highest DM rate in the world in 2019 with a total of 10.7 million sufferers with an estimate that in 2045 it will exceed 16.6 million cases.² The clinical course of DM disease depends on the level of control of blood sugar levels. Based on the International Classification of Diseases (ICD) 10th coding for Diabetes states that uncontrolled blood sugar levels in DM patients can cause damage to various organs including the kidneys, peripheral blood vessels, nerves, eyes, joints and skin.³ This statement is also supported by the study of LeMone et.al., (2016) which describes several complications that often arise due to uncontrolled blood sugar levels in DM patients, namely Diabetic Ketoacidosis (DKA) and Hyperglycemic Hyperosmolar State (HHS).⁴

Definition

Diabetic Ketoacidosis and Hyperglycemic Hyperosmolar State are emergency cases due to hyperglycemia. Both are acute complications that can occur in patients with Diabetes Mellitus⁵. DKA is a condition characterized by the triad of hyperglycemia, ketonemia, and metabolic acidosis. In DKA, the increase in blood sugar reaches 300-600 mg/dL with an increase in the anion gap and plasma osmolarity (300 - 320 mOs/mL).^{5,6} Whereas HHS is a condition characterized by a very high increase in blood glucose (> 600 mg/dL), increased plasma osmolarity (> 320 mOs/mL), without acidosis. In HHS, the anion gap can be normal or slightly increased, and plasma ketones are minimal.^{6,7}

Epidemiology

DKA and HHS contribute to the mortality and morbidity of DM patients. In the United States, DKA was the cause of 168,000 cases of hospitalization of DM patients in 2014 and increased to 220,340 cases in 2017. The prevalence of DKA is mainly found in patients aged less than 45 years and two-thirds of them are sufferers of type 1 DM. HHS is less common with <1% hospitalization rate in DM patients. However, the mortality rate for HHS is quite high, reaching 10-20%, while DKA is only 1-5%. Most HHS cases are found in patients in their fifth or sixth decade of life and nearly 90% are type 2 DM sufferers⁵.

Etiology and Risk Factor

The main etiologies of DKA and HHS are type 1 DM and type 2 DM. Several factors increase the risk of DKA and HHS occurring. The two main triggering factors are inadequate insulin therapy and the

presence of infection. Other precipitating factors include new-onset DM, metabolic stressors, myocardial infarction, cerebrovascular disease, pulmonary embolism, pancreatitis, alcohol and drug use. The use of drugs such as corticosteroids, diuretics, sympathomimetic agents, and second-generation antipsychotic agents also increases the incidence of DKA and HHS^{5,8,9,10}

Pathophysiology

Diabetic Ketoacidosis (DKA)

Starting from the destruction of pancreatic beta cells in type 1 DM patients. Damage to pancreatic beta cells causes a decrease in insulin secretion. The condition of the body that has decreased insulin secretion causes the body to be unable to process glucose properly so high levels of glucose will accumulate in the blood. As compensation, the body will use fat as an alternative energy reserve. In this process, the body does not need the insulin hormone so most of the glucose will be converted into fat through the process of lipogenesis. Furthermore, the fat will be broken down in the process of lipolysis, the result is an acidic ketone. As a result of the lipolysis process, it causes the accumulation of residues or ketones in large quantities in the body, causing a decrease in blood pH and acidosis.^{5,8}

Hyperglycemic Hyperosmolar State (HHS)

HHS begins with hyperglycemia in patients with type 2 diabetes mellitus. High blood sugar levels cause the body's response to compensate by removing it through the process of urinating. Due to very high blood sugar levels, the body will continue to excrete it through the process of urinating which eventually results in glucosuria. In the process of disposal, the body needs water to help the process of disposing of glucose in the form of urine. Glucosuria that occurs continuously will cause dehydration. This dehydration condition will cause thickening or what is called hyperosmolar. This hyperosmolar condition causes intracellular fluids to be pulled out to extracellular to maintain body fluid homeostasis.^{5, 8,9,11,12,13,14}

Diagnosis

Diabetic Ketoacidosis (DKA).

Clinical manifestations that can be experienced by patients with DKA include polydipsia, polyuria, polyphagia, nausea, vomiting, abdominal pain, and weakness. In a more threatening phase, loss of consciousness, Kussmaul breathing, and ketone-smelling breath can occur. The emergence of symptoms of abdominal pain, nausea and vomiting often makes DKA be mistaken for gastroenteritis. Apart from symptoms, a patient history can be sought that meets risk factors for DKA, such as insulin use, or a previous infection. Laboratory tests were performed to confirm the diagnosis of DKA by assessing blood glucose, urine and serum ketones, arterial blood gas analysis, serum electrolytes and osmolality. In DKA

there is an increase in blood glucose (> 250 mg/dL), metabolic acidosis (characterized by an increased anion gap, bicarbonate levels <15 mEq/L and/or pH <7.30), ketosis (ketonuria and ketoemia). Examination of serum ketones is more often used than urine ketones because of the condition of oliguria associated with dehydration. The severity of DKA is classified based on the level of acidosis as seen from pH, serum bicarbonate and ketones.^{5,16}

Hyperglycemic Hyperosmolar State

The most common clinical manifestation of HHS is a loss of consciousness that will mask other symptoms.⁸ This occurs in HHS patients due to severe dehydration due to hyperglycemia and osmotic diuresis. Laboratory tests for HHS are the same as for DKA, the difference is that acidosis does not occur in HHS patients, resulting in a pH of 7.3 and a bicarbonate level of >18 mEq/L. The hyperosmolar condition of the patient results in a serum osmolality of ≥ 320 mOsm/kg. Hyperglycemia is also found with levels ≥ 600 mg/dL.^{5,16}

Table 1. Diagnostic Criteria and Typical Total Body Deficits of Water and Electrolytes in DKA and HHS

	DKA			HHS
	Mild (plasma glucose >250mg/dl)	Moderate (plasma glucose >250mg/dl)	Severe (plasma glucose >250mg/dl)	Plasma glucose >600mg/dl
Arterial pH	7.25-7.30	7.00 to <7.24	<7.00	>7.30
Serum bicarbonate (mEq/L)	15-18	10 to <15	<10	>18
Urine ketone	Positive	Positive	Positive	Small
Serum ketone	Positive	Positive	Positive	Small
Effective serum osmolality	Variable	Variable	Variable	>320 mOsm/kg
Anion gap	>10	>12	>12	Variable
Mental status	Alert	Alert/drowsy	Stupor/coma	Stupor/coma

Treatment

NIHL disease is permanent and progressive so that it rarely or even does not require medical therapy. The main strategy that can be done is to prevent the worsening of the patient's condition and carry out rehabilitation in people who have been exposed to NIHL.¹⁴ NIHL management must be done holistically and comprehensively.¹⁶

Fluid Therapy.

Fluid therapy is the initial therapy for DKA and HHS which aims to correct fluid volume depletion in the body. In DKA conditions, the body fluid volume depletion is about 6 L and 9 L in HHS. The first choice of fluid given is normal saline (0.9% NaCl) at a rate of 15-20 ml/kg/hour or 1-1.5 L for the first 1 hour. The choice of fluid for further action depends on hemodynamic status, hydration status, serum electrolyte levels, and urine output. Patients with high or normal sodium levels are given 0.45% NaCl at

a rate of 4-14 ml/kg/hour or 250-500 ml/hour depending on the patient's hydration status and 0.9% NaCl at the same dose in patients with low sodium levels. The goal is to replace half of the estimated water and sodium deficit over 12-24 hours. When blood glucose reaches 200-300 mg/dL, fluid is replaced or added with a dextrose solution (5% dextrose in 0.45% NaCl) to avoid hypoglycemia and reduce the possibility of cerebral edema due to a decrease in blood glucose that is too fast.^{5,15}

Insulin Therapy.

Insulin therapy is given when fluid therapy is adequate. Administration of insulin before fluid therapy can cause intravascular fluid to move into the cells, exacerbating hypotension and leading to collapse (5). In adults, insulin therapy should be started with an intravenous (IV) bolus of 0.1 unit/kg, followed by a continuous infusion of 0.1 unit/kg/hour until blood glucose levels fall to 250-300 mg/dL. Another option is to give a continuous infusion of 0.14 units/kg/hour without a loading dose. If the glucose level does not fall by 10% within the first hour, an IV bolus of 0.14 units/kg/hour should be given, followed by a continuous infusion of 0.1 units/kg/hour. Children should not receive an initial bolus of insulin because it can increase the risk of cerebral edema, so it should be replaced with a continuous infusion of 0.1 unit/kg/hour. Once blood glucose levels are <300 mg/dL in HHS and <200 mg/dL in DKA, 5% dextrose should be added to IV fluids and the continuous infusion insulin dose reduced to 0.02-0.05 units/kg/hour, and blood glucose is maintained between 200-300 mg/dL in HHS and 150-200 mg/dL in DKA until consciousness returns to normal and the DKA condition is resolved.^{5,6,15,18}

If the patient is able to eat consider administering subcutaneous insulin or restarting the previous treatment regimen. In mild DKA, regular insulin can be administered subcutaneously or intramuscularly every hour at a dose of 0.4 – 0.6 u/kg, half the dose as a bolus and half the dose by subcutaneous or intramuscular injection. Then given insulin subcutaneously or intramuscularly 0.1 u/kg/hour until the DKA condition is resolved.^{5,15,18}

Potassium Therapy

Patients with DKA may experience mild to moderate hyperkalemia caused by acidosis and insulinopenia so insulin therapy, correction of acidosis, and addition of fluid volume will reduce serum potassium concentration. To prevent hypokalemia, potassium replacement is initiated once the serum level is <5.3 mmol/L (3.3-5.2 mmol/L) by adding 20-30 mmol potassium chloride to each liter of IV fluids to maintain the serum potassium concentration within the normal range. 4-5 mmol/L. In cases of hypokalemia, if the patient's serum potassium level is <3.3 mmol/L, potassium replacement should be initiated with 20-30 mmol potassium chloride fluid therapy and insulin therapy should be delayed until the potassium concentration is >3.3 mmol/L to prevent arrhythmias and respiratory muscle weakness. And if the serum potassium level is >5.2 mmol/L, potassium should be retained until the level is <5.2

mmol/L, with monitoring every two hours.^{5,15}

Bicarbonate Therapy

The use of bicarbonate in the treatment of DKA is controversial. Bicarbonate therapy has several side effects, such as hypokalemia, decreased tissue oxygen uptake, cerebral edema and delay in resolution of ketosis. However, patients with severe DKA may experience a decrease in pH if not treated with bicarbonate. Adult patients with a pH <6.9 should be given 100 mmol of sodium bicarbonate in 400 ml of sterile fluid with 20 mmol of KCL administered at a rate of 200 ml/hour for two hours. Whereas patients with a pH between 6.9-7.0 can be given 50 mmol bicarbonate in 200 ml of sterile fluid with 10 mmol KCL for two hours to maintain a pH > 7.0. If the pH is >7.0, sodium bicarbonate is not needed. After that, the pH of the venous blood is checked every 2 hours until the pH is 7.0 and the therapy can be repeated every 2 hours if necessary. For HHS conditions, bicarbonate therapy is not necessary.^{5,18}

Phosphate Therapy.

There is no evidence that phosphate therapy is necessary for the treatment of DKA or better HHS. However, in patients with potential complications of hypophosphatemia, including cardiac and skeletal muscle weakness, the use of phosphates may be considered. However, administration of phosphate can cause hypocalcemia when used in high doses.⁵

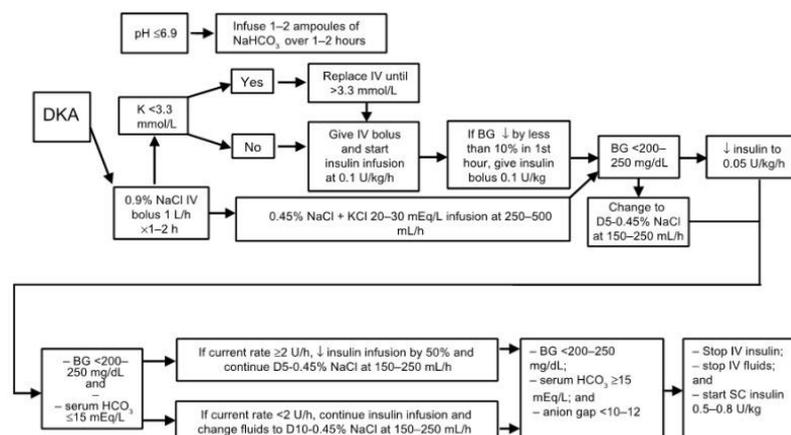


Figure 1. Protocol for the management of adult patients with DKA⁵

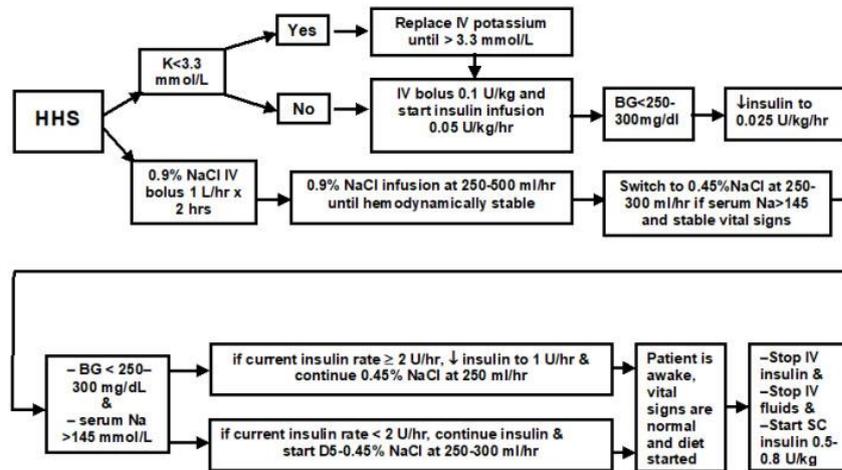


Figure 2. Protocol for the management of adult patients with HHS⁵

The simplest prevention that can be done is measuring noise. This procedure was carried out with the aim of assessing the maximum, average, minimum, intermittent type fluctuation and noise steadiness. The frequencies that are prone to causing damage to the organ of Corti in the cochlea are 3000 Hz - 8000 Hz. If exposure to high-intensity noise continues for a long time, it can cause hearing loss. After finding the source of the noise, this must be recorded and followed by measuring the time of exposure to noise. The higher the noise intensity, the relatively safe exposure time becomes shorter. This has been regulated in the Decree of the Minister of Manpower of the Republic of Indonesia no. KEP51/MEN/1999 concerning the threshold value of physical factors in the workplace. After taking the noise measurement, can be continued with noise control. This management can be done by minimizing the amount of noise at noise sources such as noise reduction at the engineering control program stage (engineering control program), installation of silencers, engine insulation and sound-absorbing materials.¹⁶

Referral System

The referral system is a reciprocal process between the team and the referring facility and the recipient. Based on the 2021 Guidelines for Treatment and Prevention of Type 2 Diabetes mellitus in Indonesia, DKA and HHS are emergency conditions in the internal sector if they are found in a primary health facility or level I health service provider who must be referred immediately to a specialist in internal medicine. A referral should be made after the patient has received initial treatment and is in a stable condition. If after taking action by a specialist in internal medicine, the conditions of DKA and HHS still cannot be resolved, then the patient must be referred to a diabetic metabolism endocrinology subspecialist doctor. After the hyperglycemia crisis is handled and blood sugar levels have been controlled, the patient

can be referred back to the referring health facility or health service provider. Controlled blood sugar levels can be seen through the criteria of fasting blood glucose (FBG) <130 mg/dL, 2 hours postprandial blood glucose (2hPBG) <180 mg/dL, and/or HbA1c <7%.⁶

Complications

Most of the complications of DKA and HHS are related to inadequate management. Hypoglycemia and hypokalemia are the most common complications of DKA and HHS caused by excessive administration of insulin and bicarbonate and are not accompanied by close monitoring. Other complications of DKA and HHS are electrolyte imbalance, cerebral edema, respiratory distress syndrome, seizures, myocardial infarction, mesenteric artery thrombosis, decreased consciousness to coma, acute renal failure, and rhabdomyolysis.^{5,15,21}

Prognosis

DKA and HHS which are treated quickly and appropriately have a fairly good prognosis.⁷ The mortality rate for DKA in adults ranges from 0.2-2.5%.¹⁹ This mortality rate is increased by 15-20% in HHS patients (20). However, the recurrence rate of DKA tends to be higher, where 1 in 5 patients with type 1 DM with DKA will be re-admitted to the hospital because of DKA within 30 days after the last incident of DKA experienced.⁵

Conclusion

Diabetic Ketoacidosis and Hyperglycemic Hyperosmolar State are acute complications of Diabetes Mellitus. Both of these complications can be triggered due to inadequate insulin therapy and the presence of infection. Diabetic Ketoacidosis is a condition characterized by metabolic acidosis due to excessive formation of ketones, while a hyperglycemic hyperosmolar State is characterized by severe hyperosmolality with serum glucose levels which are usually higher than Diabetic Ketoacidosis.

Conflict of Interest

There is no conflict of interest

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Untreated Right Ventricle Myxoma with Pericardial Effusion in Young Men: A Case Report

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ABSTRACT

Myxomas are benign cardiac tumors that are mostly found in the left atrium. We present a case of a 20-year-old male patient who presented with worsening dyspnea and signs of right heart failure. The echocardiography shows an untreated giant intracardiac mass in a rare place in the right ventricle, obstructing the blood flow, and massive pericardial effusion. We do a pericardiocentesis first to manage the pericardial effusion. Pericardiocentesis was done in different normal locations due to ascites permagna. Nevertheless, our patient needs emergency surgical excision as soon as possible to prevent sudden death caused by obstruction, embolic, and other complications.

Keywords: Myxoma; pericardial effusion; pericardiocentesis



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Introduction

Cardiac tumors are rare diseases and mostly benign, with a 0.01-0.03% prevalence. Most of them are myxomas and lipomas. Clinical symptoms of cardiac tumors are relatively varied, from a heart murmur to heart failure due to the size of the tumors. The management of these benign tumors depends on clinical symptoms, most of them need a surgical approach. We presented a case of untreated RV myxoma with clinical right heart failure, ascites permagna, and massive pericardial effusion.

Case

A 20-year-old male was admitted due to worsening shortness of breath with low saturation and abdominal distention due to ascites permagna for over 7 months. Other than right heart failure symptoms, the patient was known to have a history of RV myxoma a year ago and was planning to undergo urgent mass extirpation, but the patient refused. Transthoracic echocardiogram (TTE) showed that there's an intracardiac mass occupying the whole RV with a diameter of 7.42cm x 5.17 cm, circumferential PE without sign of tamponade.

Besides fluid overload management with Furosemide drip, Pericardiocentesis was also performed via sub costae, and a 5F pig-tail catheter was inserted, guided by ultrasonography, and showed a mass at the right ventricle with massive effusion 2 cm diameter (estimated fluid 500 ml). Aspiration of pericardial effusion showed serous fluid with a total aspiration of 500cc serous fluid. After pericardiocentesis, there are not many changes in the patient's hemodynamics. So, then we refer the patient to a type-A hospital with the expectation the patient could get his definite surgical tumor excision.

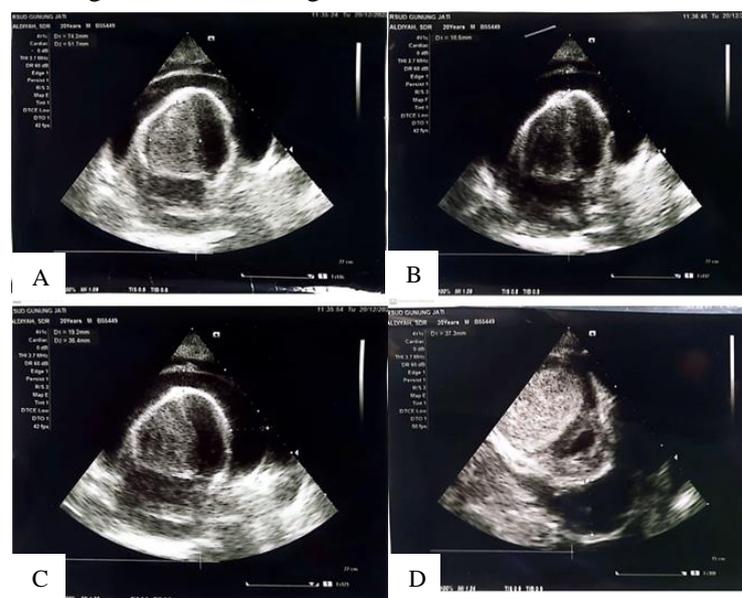


Figure 1. Four chamber views show a tumor in RV and pericardial effusion (1A, 1B, 1C), short axis view shows the tumor compresses the LV and pericardial effusion. (1D)

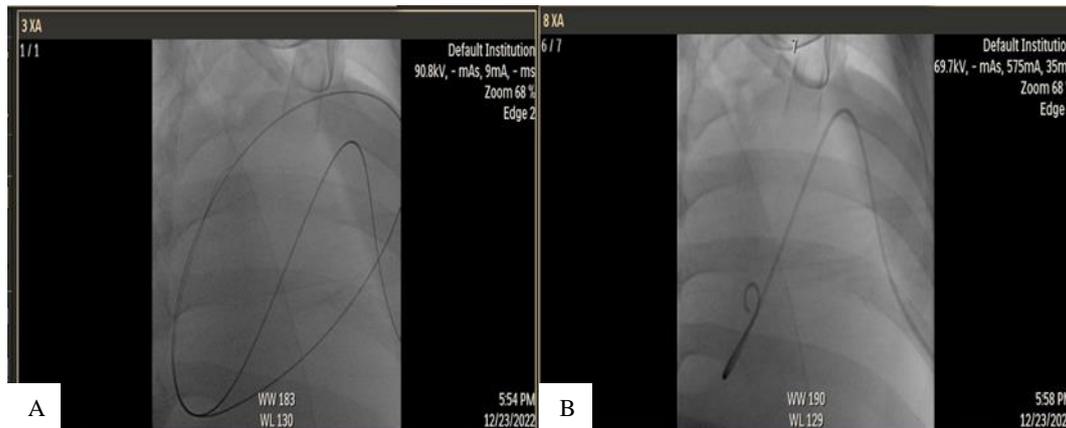


Figure 2. Subcostal sinistra location, angiographic view to know the location of the wire. (2A and 2B)

Discussion

Primary cardiac tumors are rare diseases with an approximate prevalence are 0.01-0,03% in the general population and mostly myxoma affected in middle-aged between the third and sixth decades of life and women with a case ratio of women and men 2.0:1.^{1,2} Cardiac tumors are benign (75%) half of the tumors are myxoma and the rest are lipomas, papillary fibroelastoma, and rhabdomyoma.² Myxoma is mostly found in the left atrium (75%) and rarely in the right ventricle (3-4%) and ventricular myxoma has a gross morbidity of less than 0.002% in the general population.^{3,4} Predilections of myxoma are situated on the border of the fossa ovalis in the interatrial septum or the mitral annulus. Tumor size may vary ranging from 1-15cm with most sizes ranging from 1-6cm, there's no cut-off number for the definition of giant myxoma. Besides the size, myxomas can be solid polypoid and generally pedunculated more compact and have a small chance of embolization. Whereas, in one-third of cases softer papillary myxomas are less compact, and fragile and tend to undergo embolization. Most cases are sporadic, but up to 10% are inherited by the family.^{1,3,4}

The clinical manifestation of myxomas can be different based on their location and size. It is categorized into classic triad including obstructive, embolic, and constitutional.^{4,5} Left-sided myxoma may lead to pulmonary congestion, unlike right-sided myxoma patients who mostly complain of peripheral edema and ascites. Myxoma can lead to peripheral embolies such as ischemic stroke, visual loss, and renal impairment. This happens mostly in left-sided myxoma, in which the fragile myxoma ruptures and causes peripheral embolism.^{3,4} On the other hand, the right-sided myxoma potentially becomes a pulmonary embolism as a risk from surgery. The risk for tumor embolization of myxoma pre- and postoperative regards the location of the tumors. There are a typical (tumors that arise from another cardiac chamber beside the left atrium) and typical locations (from the interatrial septum at the border of fossa ovalis in the left atrium) according to a meta-analysis study from Liu *et al* atypical location plays a

significant role.⁶

The constitutional manifestation of myxoma is mostly an inflammation disorder and connective tissue, which is pyrexia, weight loss, malaise, and arthralgia. The underlying conditions happen because the tumor itself releases cytokines IL-6 that circulate systematically and some studies said the amount of IL-6 correlates with the size of the tumor.^{2,7} Our patient shows ascites, lower limb edema, icteric sclera, and dyspnea. Those symptoms match well with right heart failure symptoms, which, in this case, are caused by the tumor's massive size that obstructs the right heart circulation and massive pericardial effusion.

This leads to patient dyspnea, mostly caused by sarcoma and its primary malignant tumors that usually cause rapid growth, local invasion, and hemorrhagic pericardial effusion.⁸ These tumors have no stalks and are usually joined in the pericardium, which leads to pericardial effusion.^{9,10} The pericardial cavity contains several lymphatic tissues that originate from the aorta and serve as drainage routes within the pericardium. Effusions may arise as a result of the lymphatic system being compromised by metastatic malignancies. Both acute and chronic pericarditis also contribute to drainage abnormalities in the pericardium and directly irritate pericardial tissue.¹¹ But, suspicion still cannot be removed before pathologically proven by biopsy, and/or pericardial fluid analysis.

Trans echocardiography (*TEE*) is one of the essential tools, an easy and cheap way to diagnose cardiac masses, the sensitivity rate is 95% for the detection of myxomas, and with transthoracic echocardiography (*TTE*) sensitivity rate of up to 100%.² it gives us information about the size and patient hemodynamics and we need to differentiate it from thrombus, which is commonly by the presence of valvular mitral stenosis, atrial fibrillation, spontaneous echo contrast (*SEC*), and is most frequently found in the left ventricle. On myxoma, characteristics are narrow stalk followed by tumor mobility and distensibility.^{4,9,12} In this case we could not find a thrombus, even though. The definitive diagnosis requires histological confirmation.

Due to our limitations in our hospital, our focus in this admission is to manage the patient's general condition by controlling the fluids excess before having the surgery. We can't rely only upon loop diuretics, since they waste the body's electrolytes and lengthen the hospitalization because of the risks. We believe pericardiocentesis and abdominal paracentesis are the best solutions to relieve the patient's symptoms for now, before performing definite action can urgently be done, which is the tumor excision followed by the biopsy and histopathology analysis. Pericardiocentesis is a technique to drain pericardial fluid, it was a blinded or ECG-guided technique by a subxiphoid approach. But it's no longer safe, therefore. The standard technique is guided by echocardiography or fluoroscopy under local anesthesia. Several entry sites can be chosen according to the localization of the effusion.¹³⁻¹⁵

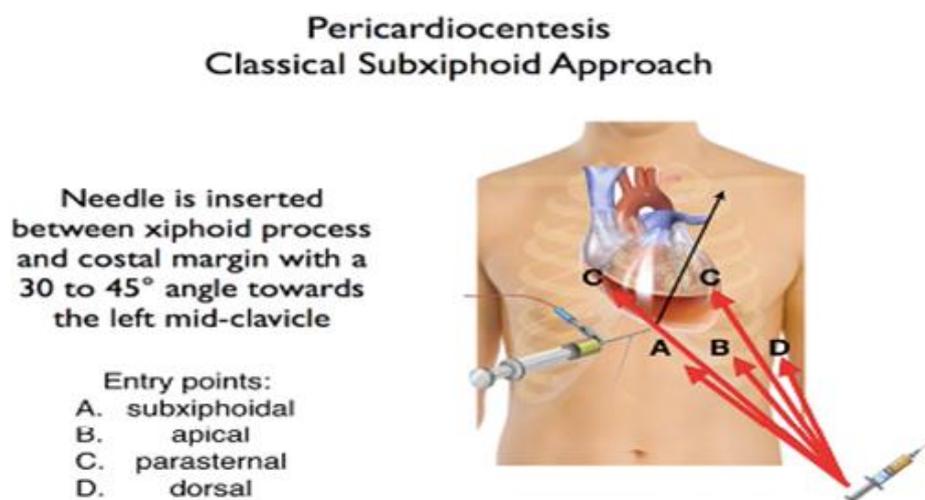


Figure 3 Classic pericardiocentesis by a subxiphoid approach.¹⁶

Our patient needs immediate surgical treatment since the prognosis rate is more than 8% of patients are dying because of obstruction, embolic, and other complications, meanwhile, the surgical mortality is less than 5%.^{3,17} Recurrency rates after surgery are rare. Nevertheless, patients with familial myxoma experience myxoma recurrence, which is more often in young males with multifocal origins or those with a family history of the tumor.^{7,18} For those, routine echocardiography is recommended. There are no guidelines on frequency and duration for monitoring. However, it would be better to monitor once a year and screen the family to find out the possibility of myxoma.²

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