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Monitoring Combination of Intermittent Auscultation and Palpation of Contractions on Oxygen Saturation of Newborns

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Abstract---*Babies who have problems and oxygen saturation is one of the things that must be maintained in newborns when low oxygen saturation causes hemodynamic disorders in infants that can cause congenital heart defects. This study aims to determine the differences in the results of the oxygen saturation test (SpO2) in newborns whose mothers were monitored using the combination method of intermittent auscultation and palpation of contractions with mothers who used cardiotocography and also to see the difference in the average SpO2 of normal and SC infants. The research method was observational with a cross-sectional approach on 36 newborns in 2 groups, namely 18 whose mothers were monitored by the combination method and 18 were monitored by cardiotocography. BBL SpO2 examination using a pulse oximeter. The average SpO2 of BBL monitored using a combination and cardiotocography did not differ (P = 0.887 > 0.05). Conclusion: There is no difference in the results of the examination of oxygen saturation (SpO2) BBL in the results of monitoring the combination of intermittent auscultation and palpation to CTG monitoring. To anticipate early abnormalities that can occur in newborns, especially hypoxia, in addition to the APGAR score examination which is a basic examination, routine SpO2 examinations should be carried out not only in hospitals.*
Keywords---*cardiotocography, contradiction palpation, intermittent auscultation, oxygen saturation*

Introduction

The main factors that cause high perinatal mortality rates in developing countries are birth trauma and infectious diseases (Gerungan et al., 2016). One of the efforts made to reduce perinatal mortality caused by fetal hypoxia in utero is by monitoring the welfare of the fetus in the womb (Herling et al., 2018; Chabibah & Laela, 2017; Liston et al., 2018; Mdoe et al., 2018).

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The World Health Organization (WHO) found in (2015) in the Association of South East Asia Nations (ASEAN) countries such as Singapore 3 per 1000 live births, Malaysia 5 per 1000 live births, Thailand 17 per 1000 live births, Vietnam 18 per 1000 live births, and in Indonesia 27 per 1000 live births. The infant mortality rate in Indonesia is still high compared to other ASEAN countries, Indonesia found that the infant mortality rate in 2016 was 22.23 per 1000 live births. The infant mortality rate in South Sulawesi in 2016 was found to be 5.64 per 1,000 live births. Meanwhile, Makassar City itself found around 0.037 per 1,000 live births (Ministry of Health of the Republic of Indonesia, 2016; World Health Organization., 2017).

Mugyenyi et al. (2017), found that the standard of care assessment for fetal heart rate (FHR) in most sub-Saharan African countries is the Pinard stethoscope (Byaruhanga et al., 2015; Mugyenyi et al., 2017). Pinard stethoscope is also known as linek in Indonesia, fetal heart rate monitoring can be done using tools such as Pinard and Fetal Doppler (Herling et al., 2018; Hamelman et al., 2017; Yeo & Romero. , 2017; Kording et al., 2018; Mdoe et al., 2018).

The two techniques, namely monitoring with Pinard and Doppler, are also known as Intermittent Auscultation (IA). The National Institute for Health and Clinical Excellence in 2014 strongly recommended IA for up to 45% of all fetal heart rate monitoring processes because it has been shown to reduce surgical intervention and is generally considered safe and recommended during labor with low-risk pregnancies (Heelan, 2013; Patey et al., 2017). The research obtained by Sholapurkar (2015), found that in fact in the field there are still many who do not understand the IA monitoring technique because the monitoring method is not precise, namely only monitoring djj for 60 seconds after uterine contractions stop, therefore to conclude that IA for 60 seconds after contractions may not be able to diagnose pathological decelerations which are one of the main goals of IA so that they can establish a diagnosis of fetal distress and immediately refer to a hospital for continued monitoring using cardiotocography even though the delivery mother is a low risk (Todd et al., 2013; Gebuza et al., 2018).

Monitoring the welfare of the fetus is very important to see the condition of the fetus so that if hypoxia occurs it can be resolved immediately. One of the causes of hypoxia in the fetus is the lack of oxygen supply obtained by the fetus during the labor process due to disturbances such as contractions. Lack of oxygen supply in the body can cause tissue damage in the body. Oxygen saturation is one thing that should be maintained in the assessment of oxygen adequacy in newborns because when oxygen saturation is low, it results in reduced oxygen supply to tissues (Maude et al., 2014; Blom et al., 2016; Smith et al., 2019).

Oxygen saturation is a measure of how much oxygen hemoglobin is able to carry. Measurement of oxygen saturation levels is something that needs to be done in order to know whether there is a lack of oxygen that can be carried by the blood throughout the body. Oxygen saturation levels in newborns are very important to know because when oxygen saturation levels in newborns are low, it is necessary to watch out for hemodynamic abnormalities in the baby.

After birth, it is important to assess the APGAR score to see if there are complications that occur in the newborn (Thavarajah et al., 2018). The APGAR assessment is also a common examination method for newborns (Bessa & Bonatto, 2019). In addition, monitoring oxygen saturation in newborns is also very important to do, by measuring oxygen saturation levels in newborns we can easily detect early bad things that might happen to children in their growth period and more quickly find out the occurrence of abnormalities. congenital heart disease (Australia et al., 2016; Movahedian et al., 2016; Heelan, 2013). Heelan (2013), found that metabolic acidemia can develop more than 60 minutes after the fetus is deprived of adequate oxygen. Referring to the above background, the researcher wishes to conduct a comparative test of monitoring the combination of intermittent auscultation and palpation of contractions on the oxygen saturation of newborns.

Research Methods

Research location and design

This research was conducted in three hospitals in Makassar City, South Sulawesi. The type of research used is observational, using a cross-sectional study design.

Population and sample

The population in this study were all pregnant women and newborns at Wahidin Sudirohusodo Hospital, Hasanuddin University Education Hospital, and Siti Khadijah I Hospital. The sample consisted of 36 inpartu mothers and 36

newborns who met the inclusion and exclusion criteria and were willing to participate in the study. this by signing the informed consent issued by the Ethics Committee of the Faculty of Medicine, Hasanuddin University.

Method of collecting data

Data collection was carried out by researchers using observation sheets and pulse oximeters. Univariate data on respondent characteristics (type of monitoring, type of delivery, and SpO2) were measured using an observation sheet and pulse oximeter. Bivariate data on the comparison of oxygen saturation (SpO2) of newborns did not differ in the results of monitoring the combination method of intermittent auscultation and palpation of contractions with CTG monitoring methods, monitoring using observation sheets and pulse oximetry.

Data analysis

Univariate data on respondent characteristics (type of monitoring, type of delivery, and SpO2) were processed using SPSS for windows 25. To assess the comparison of oxygen saturation (SpO2) of newborns, there was no difference in the results of monitoring the combination method of intermittent auscultation and palpation of contractions with CTG monitoring method, analysis was used. comparative "unpaired T test".

Result and Discussion

Sample characteristics

Table 1
Characteristics of research subjects

characteristics		Number of mothers (n=36) and babies (36)	Percentage (%)
Types of monitoring in mothers	Combination auscultation intermittent and palpable	18	50
	Cardiotocography	18	50
Gender	Man	16	43,2
	Woman	21	56,7
Type of delivery	Spontaneous	17	47,2
	SC	19	52,7
Gestational age (weeks)	37-41	27	75
	<37	9	25

Source: n= 36 intrapartum mothers and 36 newborns

Table 1 shows the characteristics of subjects who were monitored with a combination of intermittent auscultation and palpation. 16 intrapartum mothers (53.3%) were mostly examined at 37-41 weeks' gestation (75%) with female babies (56.6%). Cesarean delivery is more common than spontaneous delivery.

Results of monitoring combination IA contraction palpation and CTG

Table 2
Frequency Distribution of Monitoring Results by CTG Group and IA Group and Palpation of Contractions

Monitoring results	Group	
	CTG	Combination of IA and Palpation
Normal	15 (83,35%)	16 (88,8%)
Slow Deceleration	3 (16,6%)	2 (11,1%)
Total	18 (100%)	18 (100%)

Source: n = 36 inpartum mothers, CTG = Cardiotocography, IA = Intermittent Auscultation

Table 2 shows that the results of monitoring the combination of intermittent auscultation and palpation were normal, namely in the case group there were 15 (83.3%) while in the control group there were 16 (88.8%) intrapartum mothers. In the results of monitoring the combination of intermittent auscultation and palpation who experienced slow decelerations, the case group found 3 (16.6%). Overall, the total number of parturients in this study was 36 with 18 monitoring groups combining intermittent auscultation and contraction palpation and 18 CTG monitoring groups.

Univariate Analysis

Table 3
Distribution of images of SpO2 monitoring results in mothers who were monitored with a combination of intermittent auscultation palpation and CTG

Monitoring Types	Classification	N	%
CTG monitoring	Normal SpO2	15	84,2
	Low SpO2	3	15,8
Combination Monitoring	Normal SpO2	15	84,2
	Low SpO2	3	15,8

Source: n= 36 intrapartum mothers and 36 newborns, SpO2= Oxygen Saturation

Table 3 above shows that from 36 samples which were divided into two sample groups, each of which amounted to 18 samples using CTG monitoring, there were 15 (84.2%) infants with normal SpO2 and 3 (15.8%) infants with low SpO2. while 18 samples were monitored using a combination of intermittent auscultation and palpation with 15 (84.2%) infants with normal SpO2 and 3 (15.8%) infants with low SpO2.

Bivariate analysis

Table 4
Analysis of monitoring the combination of intermittent auscultation and palpation of intrapartum mothers on oxygen saturation (SpO2) of newborns

Monitoring	Average	P value	Mean difference (95% CI)
CTG (n=18)	80,8 (14,1)	0,887	0,66(-8,7 – 10,1)
Combination of intermittent auscultation and palpation (n=18)	80,1 (13,7)		

Source: n=36 postpartum mothers and n=36 newborns, there was no difference with p> 0.887

Table 4 shows the monitoring between groups that the results of data analysis using an unpaired T test to see the difference in the average SpO2 of newborns between CTG monitoring and the combination of intermittent auscultation and palpation obtained p = 0.887 > 0.05 in the hypothesis, meaning there is no difference in the SpO2 results of newborns. born to mothers who were monitored by the IA method and palpation of contractions with CTG.

Discussion

This study will discuss the results of monitoring intermittent auscultation and palpation of contractions on oxygen saturation (SpO2) of newborns. The results of the analysis of the combination of intermittent auscultation and palpation monitoring for the problems found. Monitoring analysis of the combination of intermittent auscultation and palpation of intrapartum mothers on oxygen saturation (SpO2) of newborns (Ermatov et al., 2022; Hanasi et al., 2022). The results of the analysis of the effectiveness of monitoring the combination of intermittent auscultation and palpation as well as CTG on the problems found to prove that there is no difference in the SpO2 of the baby that is found, if during the monitoring process both use the combination method and CTG if it is found that the monitoring results experience early deceleration then the output is Newborns are thought to have decreased oxygen saturation (SpO2). The results of the study are directly proportional to the results of the study of East et al. (2014), which stated that the monitoring carried out on the mother had no

significant value on the oxygen saturation (SpO2) of newborns, which was significant only in the delivery process. Proper monitoring of the fetal heart rate can reduce the rate of cesarean section. Rosvik et al. (2009), stated that there was no relationship between monitoring during labor and SpO2 of newborns.

Oxygen saturation (SpO2) is a measure of how much oxygen hemoglobin is able to carry. Measurement of oxygen saturation levels (SpO2) is something that needs to be done in order to know whether there is a lack of oxygen that can be carried by the blood throughout the body. The level of oxygen saturation (SpO2) in newborns is very important to know because when the oxygen saturation level (SpO2) in newborns is low, it is necessary to watch out for hemodynamic abnormalities in the baby (Kaunang et al., 2015). Before birth, all the oxygen needed by the fetus is given through a diffusion mechanism through the placenta from the mother given to the fetal blood. Doppler ultrasonography allows non-invasive evaluation of the uteroplacental circulation during pregnancy and delivery. It can measure arterial blood flow and resistance through vessels such as the uterus and umbilical arteries (Bakker & van Geijn, 2008).

In compromised fetuses or in cases of excessive uterine activity the fetus cannot compensate for stress and umbilical artery blood flow begins to decrease as well as fetal oxygenation. To compensate for this, the flow in the middle cerebral artery increases even more. The thing to watch out for is uterine activity that can be excessive and cause disturbances to the fetus, even though uterine activity is still within normal limits during the delivery process. Recent studies have shown that increased uterine activity in the first and second stages of labor may increase the risk of harm to the fetus. Therefore, monitoring using CTG or manually using Doppler is very necessary (Bakker & van Geijn, 2008; Australia et al., 2016).

The results of the researchers are in line with the research of Kaunang et al (2015), finding that in babies born vaginally there are differences in SpO2 levels with babies born by cesarean section. Babies born vaginally have a higher SpO2 than babies born by cesarean section, namely 96% of babies born vaginally and 94% of babies born by cesarean section on the first day or 10 minutes to 24 hours after the baby is born. Meanwhile, Rosvik et al. (2009), found that SpO2 was significantly higher in children born by cesarean section than in children with normal processes.

Before birth, only a small portion of fetal blood is transported to the fetal lungs. Fetal lungs do not function as a place for diffusion or a way to remove carbon dioxide so the lungs are not too perfused. The fetal lungs develop in the uterus, but the alveoli in the fetal lungs are still filled with fluid and not air. In addition, the blood vessels in the fetal lungs are constricted so that almost all the blood from the right heart cannot pass through the lungs. Therefore, almost all of the blood through the ductus arteriosus enters the aorta (VanderVeen et al., 2006; Crocker et al., 2020).

When the oxygen level in the blood increases and the pulmonary vessels relax, the ductus arteriosus quickly closes. Blood flow is immediately transferred from the ductus arteriosus to the lungs. After the transition process, newborns breathe air and use their lungs to get oxygen. Oxygen and air pressure in the lungs are the main stimuli for the relaxation of the pulmonary blood vessels. When enough oxygen enters the blood, the baby's skin will change from gray/blue to reddish. This mechanism will also describe the increase in oxygen every minute if the baby cries immediately after birth (East et al., 2014; Movahedian et al., 2016).

Thus, the researcher assumes that monitoring techniques manually or using tools will not give different results for newborn outcomes such as SpO2, so intermittent combination monitoring of auscultation and palpation can be used if we do not have sophisticated tools such as CTG because the monitoring results can still be used. to make a diagnosis if there is fetal distress and can make decisions immediately after getting abnormal monitoring results (Kamlin et al., 2006; Bahrum et al., 2020; Lim et al., 2014). The pressure that occurs during a normal birth process will make the alveoli in the lungs of the fetus come out so that after birth the baby is no longer in contact with the placenta and will immediately depend on the lungs as a source of oxygen, in contrast to babies who are born through surgery because they do not feel pressure. normal from the birth canal. The first cry and deep breaths are powerful mechanisms for removing remaining fluid from the airway (Rabi et al., 2006; Gottimukkala et al., 2021; Hunt et al., 1999).

Conclusion

There was no difference in the results of the oxygen saturation (SpO2) examination of newborns on the results of monitoring the combination of intermittent auscultation and palpation against CTG monitoring. To anticipate early abnormalities that can occur in new babies, especially hypoxia, in addition to the APGAR score examination which is a basic examination, it is better for regular SpO2 examinations to be carried out not only in hospitals. Further researchers can develop this study to see the baby's outcomes, namely blood gas and lactic acid

in infants which are associated with the monitoring method carried out on in-partum mothers and have a larger number of samples.

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