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Effect oxygen on fetal heart frequency (distress) at Panti Nugroho Hospital

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Abstract

Background: Fetal distress is one of the causes of fetal death in the world, according to the World Health Organization (WHO) in 2015, data for the last 5 years amounted to 637,000 deaths caused by fetal distress. The incidence in Indonesia is that 34.7% of 100,000 live births experience fetal distress. Fetal distress is an emergency case of pregnancy in the fetus. Fetal distress causes fetal hypoxia so that the fetus requires immediate oxygen supply. Objective:to determine the characteristics of the respondents, fetal heart rate before and after administration of oxygen, the effect of giving oxygen to in-partum patients with fetal distress at Panti Nugroho Hospital, Purbalingga.

Method: using a pre-experimental design type of one group pretest posttest. The research sample was pregnant women in childbirth with fetal distress by accidental sampling technique, namely 30 respondents. Observation sheet containing mother's identity, mother's pregnancy status, gestational age and FHR value before and after administration of oxygen. Data analysis used bivariate analysis, namely the Wilcoxon test.

Results: 20% showed an improvement in fetal heart rate of 10-20 beats/minute, 46% had an improvement in fetal heart rate of 20-30 beats/minute, while 33.3% had an improvement in fetal heart rate of more than 30 beats/minute. There is an effect of giving 4 liters/minute of oxygen to inpartu patients with fetal distress with a p value of 0.00 (p>0.05).

Conclusion: Administration of nasal cannula oxygen 4 liters/minute can affect the fetal heart rate in fetal distress. The magnitude of the effect varies depending on the length of time the oxygen is administered

Keywords: labor, administration of oxygen, fetal distress

INTRODUCTION

Fetal distress is a condition of lack of oxygen in the intrauterine, causing fetal hypoxia. Fetal mortality with causes of fetal distress is still very high in the world. According to data in 2016, with 700,000 fetal deaths worldwide, as many as 45% were caused during the birth process experiencing fetal distress. Research conducted at the Nigerian Federal Teaching Hospital in 2014, data for the last 5 years found that 29.1% of birth mothers experienced fetal distress from a total of 15,640 deliveries. This condition is still very high in fetal distress as one of the causes of fetal death during labor (Ajah, et.al. 2016).

According to the World Health Organization (WHO) in 2015 data for the last 5 years, a total of 637,000 deaths were caused by fetal distress. Incidence in Indonesia, there are 34.7% of 100,000 live births experiencing fetal distress during delivery, causing fetal distress to occur. The results of a survey conducted at the Regional General Hospital Prof. Dr. W. Z. Johannes Kupang, East Nusa Tenggara in 2014 there were 326 births with 18.8%, namely

60 babies were born with indications of fetal distress (Michaell, et. al 2015).

Based on the results of the Indonesian Demographic and Health Survey (SDKI) infant mortality in 2017 was 24/1,000 KH. There has been a decrease in the infant mortality rate, in 2017 but it has not met the specified infant mortality rate standard (12/1,000 KH). This data is secondary data from the 2017 IDHS which was conducted in 34 provinces in Indonesia. Infant mortality rates can be influenced by exogenous and endogenous factors, endogenous factors are causative factors that are brought from birth, heredity or from the mother during pregnancy. While exogenous factors are factors that occur due to the influence of the external environment. One of the endogenous factors is that it occurs due to uterine contractions that are too fast and strong. Uterine contractions in labor result in a 60% decrease in uteroplacental perfusion causing fetal hypoxia. A healthy term fetus with a normally developing placenta is able to accommodate this temporary hypoxia by activating peripheral chemoreflexes, which results in consumption of oxygen and concentration of oxygenated blood to important organs, namely the heart, brain and adrenals (Turner, et.al 2020).

The incidence of babies dying due to neonatal asphyxia is caused by antepartum and intrapartum factors such as persistent heart bradycardia, irregular fetal heart frequency, resulting in fetal distress. This can be caused by the presence of meconium in the amniotic fluid. This incident still needs to be very careful when the birth process takes place. The well-being of the fetus in the intrauterine is one of the keys to its management. So it needs supervision that focuses on the fetal heart rate during labor (Portirabella et.al 2021).

Based on the study of the determinants of the complicating factors of normal delivery with fetal distress in the maternity ward of the Banda Aceh Children's Hospital (RSIA), it was concluded that the incidence of fetal distress is associated with uterine contractions, cervical dilatation, presentation of fetal position, anxiety and pre-eclampsia. These factors can cause the fetus to lack oxygen so that it experiences fetal distress. The most common cause of fetal distress, which is almost 57%, is caused by inadequate uterine contractions during the second stage of labor (Yanti et.al 2021).

Based on research on the Management of Fetal Distress During Term Labor, it was found that a 50% increase in depth and duration decelerations on the Cardiotocogram (CTG) occurred from complicating factors in childbirth including uterine contractions, unstable fetal heart rate. Management after giving 10 liters/minute of oxygen with a Non Rebreathing Mask (NRM) for 10 to 15 minutes there was an increase. Other supporting management is by changing the mother's position on her left side and giving tocolytic drugs. It is important to monitor the fetal heart rate with CTG for at least 15 minutes until the delivery process is complete, so that the status of the fetus in the womb is always monitored (Bullens, 2018).

Fetal distress is an emergency case of pregnancy in the fetus. Fetal distress causes fetal hypoxia so that the fetus requires immediate oxygen supply. Initial therapy management is oxygen nasal cannula 2-6 liters/minute, or a simple face mask 5-10 liters/minute unless the oxygen saturation is <85% if there is a risk of hypercapnia then use a mask with a reservoir. Mothers with fetal distress deliveries are more comfortable using oxygen with a nasal cannula, but the oxygen concentration is very low, namely below 40%, so it is recommended to use a Non Rebreathing Mask (O'Driscoll, et al. 2017).

Based on service report data at PantiNugrohoPurbalingga Hospital, it was found that from January 2022 to March 2022 there were 83 fetal distress events. Based on a preliminary study conducted at the PantiNugroho Hospital Emergency Room (IGD) in Purbalingga from 1 April 2022 to 7 April 2022, the results showed that 10 of them who experienced fetal distress all received treatment with oxygen administration, and were monitored

by DJJ with CTG. It was concluded that from 10 mothers who gave birth who experienced fetal distress by administering oxygen with a nasal cannula 3-6 liters/minute during labor, 7 mothers experienced an improvement in condition marked by DJJ 5 mothers initially experienced tachycardia above normal, namely 168 times/minute while 2 the other women's DJJ is below normal, that is, the average DJJ is 103 times/minute, while the other 3 women have not experienced improvement in their DJJ condition because their DJJ is very high, which is an average of more than 180 times/minute with irregular ups and downs. Mothers who did not experience improvement in DJJ, namely 3 mothers, had to immediately take action to terminate the pregnancy with a cesarean section immediately.

Based on the problems above, the researcher is interested in researching "The Influence of Giving Oxygen with the Frequency of DJJ in Inpartu Fetal Distress Patients at PantiNugroho Hospital, Purbalingga".

METHOD

This study used the pre-experimental design research method, type one group pretest posttest, which is a study that includes one group or class that is given a pre- and post-test. The one group pretest posttest design was carried out in one group without a comparison group and the samples were not randomly selected (Sugiyono 2015).

The sample in this study were 30 pregnant women with a maternal age range of 20-42 years, gestational age 25-42 weeks, with an unspecified independent obstetric history, who were in the process of giving birth both Stage I and Stage II who experienced fetal distress at the Regional General Hospital. NugrohoPurbalingga Home. The sample size taken in this study was the incidence of fetal distress in labor at PantiNugroho Hospital in Purbalingga.

The sample in this study used an accidental sampling technique, namely taking respondents as a research sample based on coincidence, that is, anyone who coincidentally meets the researcher can be used as a sample if the person who happens to be found is suitable as a data source (Sugiyono, 2016).

The initial collection of data was by carrying out a fetal doppler examination in patients who experienced fetal distress, a fetal doppler examination was carried out by a midwife. After examining the FHR, the dominant fetal heart rate is determined. After that give oxygen therapy 4 liters / minute for 30 minutes in patients with fetal distress. Final collection of data after administration of oxygen by repeating the fetal doppler examination until the dominant fetal heart rate appears, then recording the dominant fetal heart rate.

RESULT

Description of the characteristics of the respondents

Table 1. Characteristics of the respondents

Character respondent	Frequency	Persentase
Age of pregnant women		
Productive	24	80%
High Risk	6	20%
Gestational age		
Preterm	4	13,3%
Aterm	26	86,6%
Labor progres		
Kala I laten fase	6	20%
Kala I aktif fase	17	56,6%
Kala II	7	23,3%
Accompanying diagnosis		
Kala 1	6	20%
Kala II	7	23,3%
KPD	8	26,6%
Oligohidramnion	3	10%
Preeklamsia	6	20%

Based on table 1 of data from 30 respondents who were taken from inpartu who experienced fetal distress, obtained with different vulnerable ages of pregnant women, the researchers divided them based on the productive age of pregnancy, namely the age of

the mother 20-35 years, while the age at high risk was more than 35 years. The results showed that 24 pregnant women were in the productive age for pregnancy, namely aged 25-30 years, while 6 other pregnant women were at high risk of becoming pregnant because they were over 35 years old. The percentage is more pregnant women in productive age, namely 80%, while the other 20% are at high risk of pregnancy.

In this study there was no limit to the gestational age of pregnant women who experienced labor with fetal distress, according to table 1, the results obtained from 30 respondents with 26 respondents 86.6% were of sufficient gestational age (term) in the range of 37-42 weeks of gestation, while 4 respondents 13.3% were in preterm gestation below 37 weeks' gestation.

The results of data collection from 30 respondents who experienced fetal distress in the progress of labor obtained the 1st stage of the latent phase, namely 6 respondents, while the 1st stage of the active phase was 17 respondents and the second stage was 7 respondents. It was concluded that the percentage of events for stage 1 of the latent phase was 20%, stage I of the active phase was 56.6% and stage II was 23.3%.

An overview of the fetal heart rate from 30 respondents, the researchers conducted a pretest before giving 4 liters/minute (Lpm) oxygen and a posttest after giving 4 Lpm oxygen. The data is presented in the form of a frequency table so that it can be easily categorized. The following is the initial DJJ and final DJJ data:

Table 2. DJJ frequency table data

Data	Mean	Median	Modus
DJJ before	165,63	178	178
DJJ After	147,90	150	154

Based on Table 2, the mean results obtained were processed with SPSS, the mean or average DJJ before 165.63 times/minute, this value is in the abnormal range, which is more than the normal limit of 160 times/minute, so it is said to be fetal tachycardia. While the mean FHR after 147.90 times/minute, this value is within the normal range, which is between 120-160 times/minute. Meanwhile, the median or mean value of FHR before 178 times/minute, this value is in the abnormal range including fetal tachycardia, which is more than the normal limit of 160 times/minute and the median value of DJJ after 150 times/minute, this value is in the normal range, which is between 120-160 times/minute . The mode value or that appears frequently, namely the FHR before 178 times/minute, the value is in the abnormal range including fetal tachycardia, which is more than the normal limit of 160 times/minute and the mode value after the FHR is 154 times/minute, the value is in the normal range, which is between 120- 160 times/minute.

Table 3. Category fetal distress

DJJ before (Fetal distress)	Frequency Respondent
DJJ > 160 x/menit	24 Respondent
DJJ <120 x/menit	6 Respondent

Based on the table above the frequency of the fetal heart rate obtained from the results of data retrieval from 30 respondents from the initial examination of the fetal heart rate it was concluded that more respondents had fetal tachycardia, namely 24 respondents 80%, while those who experienced fetal bradycardia were 6 respondents 20%. So it was concluded that more respondents experienced fetal tachycardia, namely 80% of the total of all respondents.

Table 4. After DJJ Result Category

DJJ After (times/minute)	Frequency	Percentage
Normal DJJ (120-160)	28	93%
Takikardia DJJ > 160	2	7%
Bradikardia DJJ < 120	0	0%

Based on table 4, it was found that the value of the fetal heart rate after being given oxygen 4 liters/minute 93% experienced a change within the normal range of 28 respondents. While the remaining 7%, namely

2 respondents, were still in a state of fetal tachycardia.

Effect of oxygen administration on FHR frequency.

Table 5. The result of wilcoxon DJJ before and DJJ after

Data		N	Standar Deviasi	Mean ranks	P
DJJ before-DJJ after	Negative ranks	24	30.187	16,92	0.00
	Positive ranks	6	11.903	9,83	
	Ties	0			
	Total	30			

This research uses the Wilcoxon sign test which is a non-parametric test to determine the effect and average difference of objects that have non-normally distributed data. There are two hypotheses in this study, namely H0, there is no effect of oxygen delivery on the frequency of the fetal heart rate. Ha there is an effect of oxygen administration with the frequency of fetal heart rate.

From the results of the Wilcoxon sign test, the asymp sig value was obtained. (2-tailed) 0.00, so that the p value of 0.00 is smaller than the alpha level of 5% (0.05) so it rejects H0 and accepts Ha, it can be concluded that there is an effect of fetal heart rate in inpartu fetal distress patients before giving oxygen 4 liters/minute and after giving 4 liters/minute of oxygen it becomes within normal limits of 120-160 times/minute.

DISCUSSION

Description of the characteristics of the respondents

Based on Table 1, it was found that the most common gestational ages in labor who experienced fetal distress occurred at productive age, namely 24 respondents, while at high risk there were 6 patients. The safe reproductive age is in the age range of 20-35 years, where beyond that age there will be risks of pregnancy and childbirth. At the age of less than 20 years, a woman's reproductive organs are not perfect, this can result in obstetric complications which can increase maternal and perinatal mortality. At the age of more than 35 years the risk of experiencing obstetric complications is higher, this is related to increased health problems such as hypertension, diabetes, placental abruption, premature labor, stillbirth and placenta previa which can increase morbidity and mortality rates, especially perinatal, whereas in After more than 40 years, mothers will tire easily, have a risk of miscarriage and are at risk of giving birth with assistive devices, such as by vacuum extraction or cesarean section (Rani, Dwi, et al., 2020).

Based on the progress of labor that occurred, more respondents experienced fetal distress occurring in the first stage of the active phase and the second stage of labor. This is because according to the opening of the cervix occurs from the 1st stage of the active phase to the 2nd stage when the opening of the cervix widens during childbirth so that the contractions will be stronger and deeper causing greater fetal distress (Prawirohardjo, 2012). There is a significant relationship between uterine contractions and fetal distress because inadequate uterine contractions have a risk of experiencing fetal distress 4 times compared to adequate uterine contractions. This means that in this condition uterine contractions affect the occurrence of fetal distress. Respondents who experienced fetal distress with cervical dilatation were in the normal category with a greater percentage than those in the abnormal category. The results of statistical tests showed that there was a significant relationship between cervical dilatation and fetal distress, with a p value of 0.054 (Yanti, 2021).

The results of 24 respondents with reproductive age included 6 respondents with prolonged first stage, 6 respondents with preeclampsia, 5 respondents with KPD, 3 respondents with oligohydramnios and 4 respondents with long second stage. In labor patients with prolonged first stage where the speed of opening and decreasing the

presentation of the fetus occurs slowly so that it lasts more than 24 hours in primigravidas and more than 18 hours in multigravidae (Saifudin, 2014).

The long labor process always has a bad impact and complications for the mother and the fetus she is carrying. The fetus in the womb becomes in a dangerous situation because uterine contractions can disrupt blood flow to the fetus, the lack of oxygen supply to the fetus during the delivery process increases the incidence of fetal distress (Prawirohardjo, 2020). Likewise, in the long II stage, involuntary tightening of the uterine muscles when giving birth to a baby directly reduces blood flow to the placenta and can compress the umbilical cord so that oxygen levels in the fetus are disrupted.

In Table 1, the results of the age of parturition of pregnant women who experienced fetal distress mostly occurred in mothers with term gestational age as many as 26 respondents and at preterm gestational age as many as 4 respondents. Gestational age is divided into 3, namely preterm gestational age less than 37 weeks, term, gestational age ranging from 37-42 weeks and postterm (Prawirohardjo, 2012). Birth at preterm age is the main cause (60-80%) of neonatal morbidity and mortality worldwide (Krisnadi, 2014), however, cases of term pregnancies accompanied by complications are also at risk.

Other conditions such as childbirth with Premature Rupture of the Membranes (PROM), KPD cause a direct connection between the outside world and the room in the uterus, making it easier for ascending infections to occur. One of the functions of the amniotic membrane is to protect or become a barrier to the outside world and the space in the uterus, thereby reducing the possibility of infection. The longer the KPD, the greater the birth complications caused so that the risk of asphyxia increases (Manuaba, 2012).

Amniotic fluid has a very important role for the development and growth of the fetus. Abnormalities in the amount of amniotic fluid can occur, and are often the earliest signs seen in a fetus that has a disorder. Therefore, abnormalities in the number of amnions that occur for any reason will increase morbidity and mortality (Wikjnosastro, 2017). At term the amount of amniotic fluid reaches around 800-1500 cc and at 42 weeks of gestation, there is a decrease of around 150 cc/week resulting in oligohydramnios. Oligohydramnios is an amniotic fluid less than 500 cc. Oligohydramnios is not good for fetal growth because of direct umbilical cord compression which can cause fetal distress (Manuaba, 2021).

Other complications such as cases of childbirth with preeclampsia are also very risky because they can cause reduced blood perfusion to the organs resulting in a spasm phase and decreased endothelial cell activity. This can cause fetal distress in the fetus so that a decision on appropriate and fast termination is required (Kusumawati, 2016).

Description of the frequency of fetal heart

Based on table 2, the frequency of FHR after giving 4 liters/minute of oxygen, the mean value is 147.90 times/minute, the median is 150 times/minute, and the mode is 154 times/minute. This is in accordance with the opinion of Williams (2014) that fetal oxygenation depends on maternal oxygenation and placental perfusion, impaired maternal oxygenation, uterine blood supply, placental transfer or fetal gas transport can cause fetal hypoxia and non-reassuring fetal status, so that after administration of oxygen with 3-6 liters/minute in inpartu patients with fetal distress can reduce the partial pressure of the fetus so that fetal hypoxia will be resolved and the condition of the fetal heart rate will return to within the normal range.

In this study there were more cases of tachycardia than cases of brachycardia, where in table 3 cases of fetal distress with tachycardia were 24 respondents and bradycardia were 6 respondents. Tachycardia in the fetus is caused by hypoxia because the fetus tries to increase the heart rate to

compensate for the decreased supply of oxygen from the mother to the fetus, so that oxygen resuscitation is really needed, while bradycardia in the fetus is caused by hypoxic events where if it occurs for a long time and persists, the chances of inadequate oxygenation will increase the risk of fetal death because the fetus only has a limited ability to increase cardiac output (Kennedy, 2013).

Effect of oxygen administration on FHR frequency

Based on the results of the Wilcoxon test, the p value of 0.00 is less than the alpha level of 5% (0.05), meaning that there is an effect of giving 4 liters/minute of oxygen on the frequency of the fetal heart rate in labor fetal distress. This is in line with previous research on the administration of 3-6 liters/minute of oxygen as intrauterine resuscitation in in-partu fetal distress in Nigeria which has proven to have an effect on increasing fetal survival and successful normal delivery and reducing the number of caesarean section due to fetal distress (Ajah et al. , 2016).

Fetal distress Fetal heart rate can occur with tachycardia above 160 beats/minute or brachycardia below 120 beats/minute, when the heart rate drops more than 15 beats per minute during contractions indicating a serious problem. Slowed DJJ reflects decreased fetal blood flow and reduced oxygen transfer during contractions in labor. This decrease in blood flow affects the cerebral oxygenation of the fetus and if it occurs is accompanied by abnormalities in the fetal heart rate, it is a serious threat to the well-being of the fetus, requiring immediate intrauterine resuscitation (Marmi, et al. 2012).

The need for fetal oxygenation in the womb is alive with an oxygen saturation <60% (Prisilia, 2021). The goal of intrauterine resuscitation management is to provide interventions that maximize fetal survival and minimize potential complications and death (Kosim, 2012).

The fetus receives oxygen from its mother through the placenta and the umbilical cord. Oxygenated blood from the mother will flow in and out of the fetus through the veins in the umbilical cord. Research at the University of Cambridge, continuous lack of oxygen in the womb can sometimes cause heart disease in the fetus in the womb, even in children in the future. This happens because reduced oxygen levels affect heart and cardiovascular development (Giussan, 2013).

Given the danger posed by fetal distress to the survival of the fetus, it is necessary to immediately take steps for intrauterine resuscitation which are intended to stabilize the condition of the fetus in the shortest possible time so that the pregnancy can continue and deliveries occur safely and can be carried out in non-critical conditions. emergency. American College of Obstetrics and Gynecology (ACOG, 2012) recommendations to improve placental perfusion and fetal oxygenation if fetal distress is found is to provide oxygenation to the mother 3-6 lpm with nasal cannula or 8-10 lpm using NRM, left oblique position or delay administration drugs that stimulate uterine contractions and if the intravascular volume is judged to be deficient then intravenous fluids are given. The outcome of intrauterine resuscitation was assessed based on changes in the parameters previously used to decide on resuscitation. In cases of fetal distress, intrauterine resuscitation should be carried out no more than 30 minutes from the establishment of a fetal emergency diagnosis until operative measures are taken for fetal survival.

Previous research conducted by Bullens, in (2018) Intrauterine resuscitation in the second stage of term labor by mothers with oxygenation and conventional care has not found relevant results in this study, but if oxygenation has an effect important in the birthing process.

CONCLUSION

1. The characteristics of the respondents were obtained based on the age of the mother in labor in fetal distress, namely 80% of productive age, 20 at high risk. The gestational age was 86.6% term, 13.3% preterm. Respondents' diagnoses were 20% for the first stage, 23.3% for the second stage, 26.6% for KPD, 10% for oligohydramnios and 20% for preeclampsia.
2. Fetal heart rate before experiencing fetal tachycardia was 80% while 20% had fetal bradycardia. FHR after 93% within normal limits and 7% still in fetal tachycardia.
3. There is an effect of giving 4 liters/minute of oxygen on the frequency of fetal heart rate in labor fetal distress, obtained a p value of 0.00.

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