



Risk factors for incidence of intrauterine fetal distress in hospital of pamekasan

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ABSTRACT

Fetal distress during intrauterine is related to many factors. Knowing the risk factors will provide an effort to prevent and detect early fetal distress cases. The objective was to determine the risk factors for fetal distress during intrauterine treatment at dr. H. Slamet Martodirdjo Pamekasan. The method used is analytic observational with a cross-sectional method and the sample is simple random sampling. Samples taken were 184 patients in the delivery room dr. H. Slamet Martodirdjo general hospital Pamekasan. Data was taken by observation from patient medical records during 2018. Through this study, 92 patients experienced intrauterine fetal distress. The main risk factors for fetal distress was umbilical cord twists (p: 0.003, OR: 6,857, 95% CI: 1,914-24,572) and protective factors were maternal anemia (p: 0.018, OR: 0.141, 95% CI : 0.028-0.714). There are several risk factors for fetal distress during the intrauterine process at dr. H. Slamet Martodirdjo Pamekasan, the main factor was umbilical cord twisting where pregnant women with umbilical cord twists have a 6 times risk of experiencing fetal distress compared to those who do not.

Keywords: Fetal Distress, Intrauterine, Risk Factors.

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INTRODUCTION

Intrauterine fetal distress is a condition associated with neonatal asphyxia and hypoxia, due to impaired oxygen flow from mother to fetus. According to data with 700,000 intrapartum deaths worldwide, nearly 45% are related to fetal distress (Liam, et al., 2016) Reporting from the Federal Teaching Hospital, Abakaliki, Nigeria, in 2008 to 2014, it was found that 29.1% of cases diagnosed with fetal distress, out of a total of 15,640 deliveries. (Leonard, et al., 2016)

In Indonesia, the incidence of fetal distress during intrauterine is 34.7% of 100,000 live births. (Ministry of Health of the Republic of Indonesia, 2013). The results of a survey in 2014 contained 326 total births with 60 babies born on indications of fetal distress at Prof. Dr. W. Z. Johannes Kupang (Michelle G. Manoeroe, 2015). According to WHO, from data on the causes of infant mortality in 2010-2015 in Indonesia, a total of 637,000 deaths were caused by fetal distress.

Regional General Hospital dr. H. Slamet Martodirdjo Pamekasan, which is a referral hospital from other hospitals in the Madura region (Regional Government of Pamekasan Regency, 2017), with 12,804 deliveries and 68 cases of fetal death caused by various factors occurred in Pamekasan Regency in 2016 (Ministry of Health Republic of Indonesia, 2018). Besides, this hospital is a network hospital of the Faculty of Medicine, University of Muhammadiyah Malang.

Based on this statement and previous research, the researcher wanted to know the risk factors for the incidence of Fetal Distress at dr. H. Slamet Martodirdjo Pamekasan.

METHODS

This research is an analytic observational study with a cross-sectional study method. This study aims to determine the causal relationship between variables by observing and recording the phenomena that occur. Research related to this case was conducted at the dr. H. Slamet Martodirdjo, Pamekasan Regency, East Java. This hospital is a network hospital of the Faculty of Medicine, University of Muhammadiyah Malang. Besides, RSUD dr. H. Slamet Martodirdjo is a referral hospital from another hospital in Madura.

Fetal distress during intrauterine is defined by changes in the intrauterine fetal heart rate pattern obtained through the medical records of dr. H. Slamet Martodirdjo Pamekasan. Judging by changes in fetal heart rate $<120 \text{ x / minute}$ or $> 160 \text{ x / minute}$ (Gravett, et al., 2016). Fetal distress is measured using a fetal heart rate measuring device in the form of a nonstress test, Doppler, and Laennec's stethoscope (Prawiroharjo, 2016). Which is done when the patient comes and recorded in medical records.

The sample in this study were deliveries who experienced fetal distress during intrauterine at dr. H. Slamet Martodirdjo in 2018 (1 January-31 December). In this study, sampling using simple random sampling. Sampling begins by giving serial numbers to members of the population, then the sample is taken through a randomized lottery number with a predetermined number of samples (Endra, 2017). The inclusion criteria in the sampling were delivery with a fetus diagnosed with fetal distress during intrauterine with gestational age at term (37-42 weeks) and postterm (> 42 weeks) in dr. H. Slamet Martodirdjo, Pamekasan Regency in 2018 (1 January-31 December).

Researchers used tools and materials in the form of medical records from dr. H. Slamet Martodirdjo Pamekasan in 2018 to obtain the required data, and use the SPSS 22 program to process data. The data analysis was used as bivariate analysis. Bivariate analysis is used to prove the research hypothesis between the independent variables which is the cause of changes in the dependent variable. In this study, a hypothesis test was used in the form of a correlative test for contingency coefficients with the two variables in nominal form. (Endra, 2017).

RESULTS AND DISCUSSION

Based on the results of research conducted at dr. H. Slamet Martodirdjo Pamekasan, conducted on 12-15 January 2020, with a total sample size of 184 samples consisting of 92 fetuses with a diagnosis of fetal distress during intrauterine and 92 fetuses who were not diagnosed with fetal distress during intrauterine through secondary data in the form of records. medical.

From this study, it was found that the number of fetal distress incidents during intrauterine in 2018 was 368 cases, with the number of fetal distress during intrauterine with meconium amniotic number of 119 cases. The incidence of meconium amniotic labor in this study was obtained in as many as 394 cases with various comorbidities.

After the research data has been collected, data editing, data coding, and data entry into tables are carried out. The data were then processed using the SPSS 22 program. This study used a logistic regression test to determine which risk factors could cause intrauterine fetal distress and also used the contingency coefficient test to determine the relationship between intrauterine fetal distress and meconium amniotic incidence.

The characteristics of respondents are shown in table 1. From the characteristics of respondents based on gestational age, 133 (73.38%) had a gestational age at term (37-42 weeks), with 63 cases diagnosed with intrauterine fetal distress and 70 cases undiagnosed with fetal distress. at the time of intrauterine. For pregnancies with post-term gestational age (> 42 weeks), there were 51 cases (27.71%), with 29 cases (57%) experiencing intrauterine fetal distress and 22 cases (43%) having no fetal distress when intrauterine.

The table shows the risk factors for fetal distress during intrauterine at RSUD dr. H. Slamet Martodirdjo Pamekasan. In the table, it is found that the most common risk factor for causing fetal distress during intrauterine is umbilical cord twisting, with a frequency of 40 cases (29.62%), with 29 (72%) cases occurring in fetuses diagnosed with fetal occurrence. distress during intrauterine. This was followed by placental abruption as the second most common risk factor for intrauterine fetal distress, with 28 cases (20.74%), of which 19 (68%) were diagnosed with intrauterine fetal distress. The least factor that occurs to cause fetal distress during intrauterine in the hospital is fetal anemia, with 4 cases (2.96%).

The bivariate analysis uses the chi-square test, which is shown in table 3. From the bivariate test table, then enter the risk factor for fetal distress which has $p < 0.25$ to carry out the logistic regression test, namely maternal anemia, malnutrition, fetal infection, abruption of the placenta, umbilical cordtwists.

Table 1. Respondent's Characteristics

Characteristics		With intrauterine fetal distress		Without fetal distress		Total
		number	%	number	%	
Gestational age	37-42 weeks	63	47	70	53	133 (73,38%)
	>42 weeks	29	57	22	43	51 (27,71%)
Risk factors	Hypotension	8	53	7	47	15 (10,94%)
	Maternal Anemia	13	61	8	38	21 (15,55%)
	Malnutrition	7	100	0	0	7 (5,18%)
	Primary hypoplasia	3	37	5	63	8 (5,92%)
	Infection of fetus	10	72	4	28	14 (10,37%)
	Fetal anemia	3	75	1	25	4 (2,96%)
	Solutio placenta	19	68	9	32	28 (20,74%)
	Umbilical cord twisting	29	72	11	23	40 (29,62%)
Without risk factors				47	47	47 (100%)
Total					184	

Table 2. Univariate analysis

		<i>Fetal distress</i>		<i>None of fetal distress</i>	
		number	%	number	%
Risk factors of fetal distress	Hypotension	8	53	7	47
	Maternal Anemia	13	61	8	38
	Malnutrition	7	100	0	0
	Primary hypoplasia	3	37	5	63
	Infection of fetus	10	72	4	28
	Fetal anemia	3	75	1	25
	Solutio placenta	19	68	9	32
	Umbilical cord twisting	29	72	11	23

Table 3. Bivariate analysis

		<i>Fetal distress</i>		<i>None of fetal distress</i>		<i>P</i>
		Number	%	Number	%	
Risk factors	Hypotension	8	53	7	47	1.000

<i>of fetal distress</i>	Maternal Anemia	13	61	8	38	0.246
	Malnutrition	7	100	0	0	0.014
	Primary hypoplasia	3	37	5	63	0.720
	Infection of fetus	10	72	4	28	0.095
	Fetal anemia	3	75	1	25	0.621
	Solutio placenta	19	68	9	32	0.040
	Umbilical cord twisting	29	72	11	23	0.002

Table 4. Regression test

	B	p	OR	IK95%	
				Min	Max
Maternal anemia(1)	-1.962	0.018	0.141	0.028	0.714
Infection of the fetus (1)	0.000	1.000	1.000	0.120	8.306
Malnutrition(1)	21.491	0.999	215397403 1.809	0.000	.
Solutio placenta (1)	0.182	0.891	1.200	0.089	16.239
Umbilical cord twisting (1)	-1.925	0.003	6.857	1.914	24.572
Constant	-21.203	0.999	0.000		

The relationship between the risk factors for fetal distress and the occurrence of fetal distress, seen from the p-value with $p < 0.05$, indicates that there is a relationship between the risk factors for fetal distress and the occurrence of fetal distress. The strength of the relationship can be seen from the OR value. The strengths of the relationship from greatest to smallest are maternal anemia, umbilical cord twisting, and malnutrition. Where (1) is yes and (2) is no. So that in the table above it can be seen that the risk factors that influence fetal distress are maternal anemia and umbilical cord, with the greatest strength of the relationship is that the umbilical cord has an OR of 6,857, which means that pregnancy with umbilical cord twists has a probability of 6,857 times to experience it. fetal distress compared with those without umbilical cord twisting. Then followed by maternal anemia has an OR of 0.141. The OR < 1 value is protective, so it can be said that pregnancies with maternal anemia have a 0.141 times smaller risk of getting fetal distress than those without maternal anemia. The equation obtained through the logistic regression test is:

$$y = \text{konstanta} + a_1x_1 + a_2x_2 + \dots + a_nx_n$$

with a is number of B dan x is influential risk factors for fetal distress.

$$y = -21.203 - 1.962 (\text{maternal anemia}) + 1.925 (\text{twisting})$$

According to analyze the relationship between intrauterine fetal distress and meconium amniotic events in dr. H. Slamet Martodirdjo Pamekasan, the correlation test was carried out using the contingency coefficient test with the independent variable, namely fetal distress during intrauterine and the dependent variable, namely meconium amniotic events, both of which have nominal data scales.

According to the data on the characteristics of respondents in this study, it was obtained from 51 patients with gestational age (> 42 weeks), as many as 29 cases (57%) experienced fetal distress during intrauterine and 22 cases (43%) did not experience fetal distress during intrauterine. Meanwhile, from 133 patients with gestational age 37-42 weeks, 63 cases (47%) experienced fetal distress during intrauterine and 70 cases (53%) did not experience fetal distress during intrauterine.

The results of this study indicate that the incidence of intra-uterine fetal distress is higher at gestational age > 42 weeks. This is consistent with the research conducted by Wong, the incidence of fetal distress with gestational age > 42 weeks was 42 cases out of a total of 506 pregnancies (8.3%) while at 37 weeks gestation there were 44 cases of fetal distress from a total of 647 pregnancies. (6.8%) (Wong, et al., 2002).

Data obtained on the characteristics of respondents in this study found that of all the incidents of experiencing meconium amniotic fluid, as many as 47 cases, 36 cases (77%) of them experienced fetal distress during intrauterine while 11 cases (23%) did not experience fetal distress during intrauterine.

According to a study conducted by Saroop, out of a total of 136 deliveries with meconium amniotic fluid, 91 cases (67%) of them experienced intrauterine fetal distress (Chand *et al.*, 2019). And according to research conducted by Peter, there were 1061 deliveries with amniotic membranes, 51% of whom were accompanied by intrauterine fetal distress (Peter & Beverley, 2006). In the other study said that fetal distress had an odd ratio 7.19 to cause the preterm birth (Hanif *et al.*, 2020).

Risk factors for fetal distress during intrauterine include (1) umbilical cord wrapping. Characteristics of research respondents found that umbilical cord twisting is the biggest risk factor for fetal distress during intrauterine. The umbilical cord coils that occurred in this study were 40 cases (29.62%), with 29 (72%) cases occurring in fetuses diagnosed with intrauterine fetal distress. And in the logistic regression test, umbilical cord twisting is one of the risk factors that influence the occurrence of fetal distress during intrauterine with $p = 0.003$ and OR 6,857, which means that pregnancy with umbilical cord twists is 6,857 times more likely to experience fetal distress compared to those who do not. experiencing umbilical cord twists. This is also following a cross-sectional study conducted in 96 pregnancies with umbilical cord winding accompanied by fetal distress characterized by umbilical cord pH < 7.2, it was found that 14% of cases experienced amniotic fluid with meconium (Mousa Ahmadpour-Kacho, et al., 2010). We found that any umbilical cord occlusion that could be caused by twisting of the umbilical cord resulted in a fetal heart rate deceleration that lasted the entire 2 min occlusion. This results in a decrease in blood

pressure and leads to a progressive decrease in fetal pH and an increase in alkaline and lactate deficits (Ardalan *et al.*, 2019). Recently, there were a study that aimed to evaluate Sildenafil citrate (SC), a phosphodiesterase 5 inhibitor, to reduce the risk of intrapartum fetal compromise. SC improves uterine blood supply through vasodilatation and potentially could improve placental perfusion and hence reduce the risk of intrapartum fetal hypoxia (Dunn, Flenady and Kumar, 2016). Study of Pergialiotis, *et al* showed that there was involvement of cord entanglement to adverse neonatal perinatal outcomes. Fetal distress was significantly higher in the entanglement group (RR 1.50, 95% CI 1.33, 1.69) (Pergialiotis *et al.*, 2019).

(2). Maternal anemia. According to the data in this study, 21 (15.55%) cases of maternal anemia were experienced from a total of 184 samples, with 13 cases experiencing fetal distress during intrauterine and 8 cases without fetal distress during intrauterine. Through the logistic regression test, it was found that maternal anemia was a risk factor that affected the occurrence of fetal distress during intrauterine with a p of 0.018 with an OR of 0.141. The OR <1 value is protective, so it can be said that pregnancies with maternal anemia have a 0.141 times smaller risk of getting fetal distress than those without maternal anemia. This is following the research conducted by Shaimaa that there is a relationship between maternal anemia and changes in the systolic/diastolic fetal heart rate due to reduced oxygen intake for prolonged fetal development (p <0.05), especially in the group with severe anemia, so that it will lead to against the occurrence of fetal distress during intrauterine (Shaimaa, et al., 2018). Maternal anemia is a class of high-risk pregnancies that can cause complications in pregnancy such as fetal death, fetal infection, oligohydramnios, and fetal distress. Pregnancy continues to be high risk for patients with anemia. Maternal perinatal mortality could be unpredictable due to serious complications of sickle cell disease or other cause of anemia (Rizk *et al.*, 2017).

From the research conducted by Park, it was found that there was an irregularity in the fetal heart rate in pregnancies with maternal anemia, and the irregularity in the fetal heart rate increased with a decrease in Hb levels. Stolen maternal anemia is the cause of decreased oxygen supply to the fetus, and can be responsible for the redistribution of fetal blood flow. All pregnancies that have maternal anemia experience poor outcomes, but maternal anemia can only cause acute fetal distress during an intrauterine time (Park & Hoh, 2015). Maternal anemia in pregnancy represents a common and potentially reversible risk factor associated with antepartum, intrapartum, and postpartum maternal morbidity and perinatal morbidity and mortality. Anemia was associated with preterm birth, small-for-gestational-age live birth, low 5-minute Apgar score, neonatal death, and perinatal death (Smith *et al.*, 2019).

Maternal anemia not only can cause fetal distress, but also can cause maternal morbidity. Women with antepartum anemia experience increased rates of severe maternal morbidity (SMM) and other serious adverse outcomes. Diagnosis and treatment of anemia during the antepartum period may lead to identification and treatment of women at higher risk of maternal morbidity and mortality (Harrison *et al.*, 2021).

The results of this study obtained the research p-value through the contingency coefficient test was less than 0.05, namely 0.000, which means that the hypothesis is valid. So it is found that there is a significant correlation between fetal distress during intrauterine with the incidence of meconium amniotic fluid. And from the correlation coefficient test, the result is 0.297, which means that the correlation between intrauterine fetal distress and the incidence of meconium amniotic fluid is said to be weak. The correlation is said to be weak if it is <0.05 and strong if it gets closer to 1.

The relationship between the incidence of meconium amniotic fluid and fetal distress during intrauterine has been calculated by many investigators. In a study by Yoder, infants with meconium amniotic fluid with moderate to thick thickness were substantially increased in terms of precipitating factors, one of which was through the symptoms indicated by the presence of fetal distress (irregular fetal heart pattern, fetal acidosis) in contrast to infants without meconium and newborn with light meconium stain ($P < 0.01$). In a study by Berkus et al., The medium and thick meconium groups had a fundamentally higher hazard, as evidenced by an abnormal fetal heart rate and cord blood vessels with a pH below 7.20 (markers of intrauterine fetal distress) (Chand *et al.*, 2019). In a study by Tolu et al said that meconium-stained amniotic fluid is associated with increased frequency of operative delivery, birth asphyxia, neonatal sepsis, and neonatal intensive care unit admissions compared to clear amniotic fluid (Tolu *et al.*, 2020).

From Leonard's research, 320 cases of fetal distress, of which 13.4% or 43 cases were accompanied by meconium in amniotic fluid, showed that there was a lack of significant relationship between fresh meconium in amniotic fluid and fetal distress in the study (Leonard, et al., 2016). This is also supported by previous reports that the occurrence of abnormalities in fetal heart rate tracking when the fetus is experiencing meconium-mixed amniotic fluid tend to indicate intrauterine fetal distress. The meconium in the amniotic fluid is caused by relaxation of the anal muscular sphincter, induced by the failure of oxygenation of the fetal blood, causing fetal acidemia and stimulating the vagus nerve followed by intestinal peristalsis so that the anal sphincter opens. Even so, obstetricians have long realized that the presence of meconium at delivery is a problem in predicting fetal distress or asphyxia (Williams, 2014). There is still a lot of controversies, regarding whether meconium amniotic fluid is a sign of fetal intestinal maturity or a risk factor for intrauterine fetal distress in the fetus. So that in this study, gestational age is the confounding variable the study.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the incidence of fetal distress during intrauterine in dr. H. Slamet Martodirdjo Pamekasan in 2018 was a total of 368 cases, with the number of fetal distress during intrauterine with meconium amniotic number of 119 cases. Risk factors for fetal distress during intrauterine at dr. H. Slamet Martodirdjo Pamekasan

is a mother of hypotension, maternal anemia, malnutrition, primary hypoplastic growth, fetal infection, fetal anemia, abruption of the placenta, and umbilical cord twists. Umbilical cord twisting and maternal anemia are the most influential risk factors for causing fetal distress during intrauterine.

The results of this research can be used as a preliminary study for further research by expanding other variables that are thought to be other factors that cause meconium amniotic events, such as the factor of gestational age. Medical personnel is advised to be able to screen and record risk factors causing fetal distress during intrauterine from an early age for planning the prevention of meconium-mixed amniotic fluid in patients, and this can facilitate data collection on the incidence of fetal distress during intrauterine and its risk factors and incidence of meconium at the time. labor.

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