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Contribution of Maternal Factors to Preterm Labor at South Konawe Regency Hospital

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ABSTRACT

Introduction: In general, under-five mortality in Southeast Sulawesi province where it is estimated that more than 50% of deaths are caused by the risk impact of low birthweight, asphyxia, pneumonia, diarrhea and congenital abnormalities. The low birthweight incidence rate with the most cases was found in South Konawe Regency with 266 babies from a total of 5,796 births. The purpose of the study was to determine the contribution of maternal factors to the occurrence of Preterm Labor at South Konawe District Hospital.

Method: Research Method was quantitative with an observational approach using the Case Control Study design. This study was carried out from February to March 2023 at South Konawe District Hospital with a total sample of 116 respondents. The sampling technique for the group of conditions (Premature Copying) carried out in this study used probability samples, namely Simple random sampling.

Result: The results of the study found that the age of the mother had a risk of 5.88 times the incidence of Preterm Labor, Parity risked 6.75 times the incidence of Preterm Labor, a history of pregnancy complications at risk of 14.29 times the incidence of Preterm Labor and Chronic Energy Deficiency risk 23 times.

Conclusion: Mother's age, parity, history of pregnancy complications, and chronic energy deficiency are risk of Preterm Labor at South KonaweRegency Hospital.

Introduction

Health Preterm birth has both long-term and short-term impacts. For the short term, newborns can experience death because the gestational age is very less so that the formation of organs and body work systems is not perfect. Preterm birth also increases the chances of babies being born underweight, asphyxia, sepsis and other complications. *Quality of Life* with long-term impacts can be specific physical disorders such as vision, hearing, chronic lung disease, and cardiovascular disease.[1]

Globally, 2.4 million children died in the first month of life in 2020. There are approximately 6700 newborn deaths every day, amounting to 47% of all deaths of children under

the age of 5. The chances of survival from birth vary greatly depending on where a child is born. Sub-Saharan Africa had the highest neonatal mortality rate in 2020 at 27 (25-32) deaths per 1000 live births, followed by central and southern Asia with 23 (21-25) deaths per 1000 live births.[2]

Every year it is estimated that around 350,000 premature or low birth weight babies are born in Indonesia. The high birth of premature babies is because there are currently 30 million *women* of childbearing age whose condition is chronically lacking energy and about 50% of pregnant women experience nutritional deficit anemia.

Based on data reported to the Directorate of Family Health in 2020, of the 28,158 neonatal deaths, 72.0% (20,266 deaths) of them occurred during the neonatal period. Of all reported neonatal deaths, 72.0% (20,266 deaths) occurred between 0-28 days of age. Meanwhile, 19.1% (5,386 deaths) occurred at the age of 29 days – 11 months and 9.9% (2,506 deaths) occurred at the age of 12 – 59 months.[3]

The trend of child mortality from year to year shows a decrease where data reported to the Directorate of Nutrition and Maternal and Child Health shows that the number of neonatal deaths in 2021 was 27,566 deaths under five, a decrease compared to 2020, which was 28,158 deaths. Of all under-five deaths, 73.1% occurred in the neonatal period (20,154 deaths).[3]

Premature birth babies can be characterized by low birth weight and in Indonesia can be seen low birth weight data for the last three years. Based on data reported from 34 provinces to the Directorate of Nutrition and Maternal and Child Health, in 2021 there were 3,632,252 newborns reported to be weighed (81.8%). Meanwhile, of the newborns weighed, there were 111,719 low birth weight babies (2.5%). The number of low-birth-weight babies decreased compared to the previous year, which was 129,815 babies (3.1%).[3]

According to infant mortality in Southeast Sulawesi Province, based on data from the health profile of Southeast Sulawesi Province in 2021, it is known that there are 447 deaths of infants and toddlers with various causes, including babies born with low birthweight with a percentage of 21%, asphyxia 22.15%, and illness due to pneumonia, which is 3.36%. In general, under-five deaths in Southeast Sulawesi province where it is estimated that more than 50% of deaths are caused by the risk impact of low birthweight, Asphyxia, Pneumonia, Diarrhea and Congenital abnormalities.[4]

According to infant mortality in Southeast Sulawesi Province, based on health profile data for Southeast Sulawesi Province in 2021, it is known that there are 447 infant and toddler deaths with various causes, including babies born with low birthweight with a percentage of 21%, asphyxia 22.15%, and illness due to pneumonia, which is 3.36%. In general, under-five mortality in Southeast Sulawesi Province where estimates are more of 50% of deaths are caused by the risk effects of premature birth babies such as low birthweight, asphyxia, pneumonia, diarrhea and congenital abnormalities.[4]

In general, the number of premature birth babies in Southeast Sulawesi Province fluctuated where in 2017 it amounted to 3.26%, in 2018 it decreased by 2.29%, in 2019 it increased by 3.16%, in 2020 it decreased by 2.65% and in 2021 it experienced an increase which in a period of 5 years had never increased to 3.38%. Many factors can cause an increase in the incidence of premature birth, some of which are the economic level and knowledge of the mother, as it is known that malnourished pregnant women are more likely to give birth to premature babies or low birth weight compared to mothers who are well nourished, lack of awareness to check pregnancy to health workers also increases the risk of premature babies or low birthweight, because thus pregnant women with anemia become undetectable so that they do not get Fe table intake during their pregnancy.[4]

When compared to the previous year provincial low birth weight of 2.65%, in 2020 there was an increase of 0.73%. For vital indicators such as low birth weight, this figure is still relatively high. Especially in South Konawe district, it is known to have increased the prevalence rate of premature birth babies or low birth weight which is 2.65% and ranks 1st highest in Southeast Sulawesi Province.[5]

Data on premature births at South KonaweRegency Hospital for the last three years can be seen in 2019 there were 115 maternity mothers with 70 (60.86%) premature deliveries found, in 2020 there were 100 maternity mothers with 86 (86%) premature deliveries found and in 2021 there were 100 deliveries and found with premature deliveries of 68 (68%). And in 2022, it was found that data on preterm labor was 65 cases and thus cases of premature labor increased from the previous year.[6]

South KonaweRegency is the smallest district in Southeast Sulawesi Province with an island-shaped area with an estimated referral trip to

the Provincial Hospital with an estimated trip of more than 3 hours by sea to get to the service facility. Low levels of education, early marriage, Gravidity and parity of more than 4 are triggers of maternal problems with preterm labor, this was found in the medical record data of patients with childbirth visits in the same room.

Method

This research is quantitative with an observational approach that uses the design of *Case Control Study*, which is to collect, process analysis, and describe information and data systematically, while increasing understanding of certain phenomena.[7]

Result

Table 1 showed that from the results of Chi Square analysis 18.33 > X^2 3.841 which means that there is a significant relationship between age variables and the incidence of Preterm Labor and the results of epidemiological analysis obtained an OR value of 5.88 times where the lower threshold value is 2.63 and the upper threshold value is 13.15.

Table 2 showed that from the results of data analysis *and Chi Square* value 20.35 > X^2 3.841 which means there is a significant relationship between the parity variable and the incidence of Preterm Labor. The results of epidemiological analysis obtained an OR value of 6.75 times where the lower threshold value was 2.94 and the upper threshold value was 15.50.

Table 3 showed that from the results of data analysis and obtained *Chi Square value* 35.83> X^2 3.841 which means there is a significant relationship between the variable History of complications with the incidence of Preterm Labor. And the results of epidemiological analysis obtained an OR value of 14.29 times where the lower threshold value was 5.73 and the upper threshold value was 35.67.

Table 4 showed that from the results of data analysis and obtained Chi *Square value* 47.26> X^2Table3.841 which means there is a significant relationship between the variable of chronic energy deficiency and the incidence of Preterm Labor. And the results of epidemiological analysis obtained an OR value of 23.26 times where the lower threshold value was 8.84 and the upper threshold value was 61.21.

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Table 1.
The mother's age is a risk factor for preterm labor at South Konawe District Hospital

Age	Labor				Σ	%	*Chi-Square*	Phi	OR	Confidence Internal	
	Premature (Case)		Not Premature (Control)								
	f	%	f	%						Lower	Upper
At Risk	39	67,24	15	25,86	54	46,55	18,33	0,42	5,88	2,63	13,15
No Risk	19	32,76	43	74,14	62	53,45					
Total	58	100	58	100	116	100					

Table 2.
Parity is a risk factor for preterm labor at South Konawe District Hospital

Parity	Labor				Σ	%	*Chi-Square*	Phi	OR	Confidence Internal	
	Premature (Case)		Not Premature (Control)								
	f	%	f	%						Lower	Upper
At Risk	46	79,31	21	36,21	67	57,76	20,35	0,43	6,75	2,94	15,50
No Risk	12	20,69	37	63,79	49	42,24					
Total	58	100	58	100	116	100					

Table 3.
History of pregnancy complications is a risk factor for preterm labor at South Konawe District Hospital

History of Complications	Labor				Σ	%	*Chi-Square*	Phi	OR	Confidence Internal	
	Premature (Case)		Not Premature (Control)								
	f	%	f	%						Lower	Upper
At Risk	42	72,41	9	15,52	51	43,97	35,83	0,57	14,29	5,73	35,67
No Risk	16	27,59	49	84,48	65	56,03					
Total	58	100	58	100	116	100					

Table 4.
Chronic Energy Deficiency is a risk factor for Preterm Labor at South Konawe District Hospital

Chromic Energi Deficiency	Labor				Σ	%	*Chi-Square*	Phi	OR	Confidence Internal	
	Premature (Case)		Not Premature (Control)								
	f	%	f	%						Lower	Upper
At Risk	49	84,48	11	18,97	60	51,72	47,26	0,66	23,26	8,84	61,21
No Risk	9	15,52	47	81,03	56	48,28					
Total	58	100	58	100	116	100					

Discussion

The Mother's Age is a Risk Factor for Preterm Labor at South Konawe Regency Hospital

It is known from the results of the analysis that there is a significant relationship between age variables and the incidence of Preterm Labor and Among 116 respondents based on the age declared Preterm Labor and at risk there are 39 (67.24%) and from 116 respondents stated not to experience Preterm Labor and not at risk amounting to 15 (25.86%). This states that respondents with Preterm Labor are more found due to age factors with the age category of 20-35 years compared to respondents who are not Preterm Labor < 20 years and in > 25 years. As well as the results of epidemiological analysis, the OR value was obtained 5.88 times where the lower threshold value was 2.63 and the upper threshold value was 13.15.

Mothers under the age of 17 were 21% more likely to have a premature baby with their first pregnancy and 93% more likely to have their second baby early. Younger pregnant women have a relationship or potential for birth with low-birth-weight babies. Overall, older mothers (over age 35) are more likely than younger women to experience complications during pregnancy and delivery.[8]

Age is the length of time a person lives and is calculated based on the last birthday, which is recorded in the mother's status book. Age 20-35 years is the safest period for pregnancy and childbirth, age under 20 years and over years has a high risk of pregnancy and childbirth and postpartum for complications including preterm labor. Women 35 years of age and older are at increased risk of complications during childbirth.[9]

Previous research with titled Risk Factors for Preterm Labor at Polewali General Hospital in 2021 where the results of the study were known that pregnant women aged < 20 years or > 35 years had a risk of 2,473 times preterm labor compared to pregnant women aged 20-35 years, mothers who had a pregnancy gap of < 2 years had a 5,666 times risk of preterm labor compared to mothers who had a distance pregnancy ≥ 2 years.[10]

Age is an important part of reproductive status. Age relates to the increase or decrease in body functions that affect a person's health status. A good age for pregnant women is 20-35 years. Women at the age of more than 35 years are more prone to experience various health problems, one of which is Preterm Labor.

This happens because of changes in the tissues of the uterus and the birth canal is no longer flexible as well as blood vessels, also caused by blood pressure that increases with age, causing oedema and proteinuria The age of 35 years is actually not considered vulnerable, only at this age reproductive ability begins to decline so that the age over 35 years is considered a phase to terminate pregnancy.

Previous research explains that relationship between young maternal age and preterm birth was investigated in a subsample of 605 primigravidas enrolled in the CamdenStudy (New Jersey, USA). This included 366 adolescents under 16 years old (cases) and 239 women aged 18-29 years (controls). 36.3% of young mothers had a low gynecological age (i.e., their chronological age was 2 years or less than their age at menarche). The risks associated with younger age and higher gynecological age increased only slightly. These findings suggest that it is often biological immaturity that is associated with young age, rather than young maternal age, that increases the risk of teenage pregnancy. The association between low gynecological age and preterm labor is thought to reflect adolescent uterine irritability, sensitivity to dehydration, and/or an altered hormonal environment that promotes maternal development at the expense of fetal well-being.[11],[12]

Previous research by Songxu Peng. et al, (2020) entitled Maternal age and education level modify the relationship between chronic hepatitis B infection and preterm labor involving 2050 pregnant women in women aged <30 years with an OR of 1.65 (95% CI 1.07-2.54).[13]

The maternal age factor is one of the factors that influence the occurrence of labor complications because the younger the age of the mother during labor, the greater the possibility of complications due to the mother's pelvis that is still narrow and the reproductive organs that have not matured, gestational age that is too young during labor results in babies born prematurely.[14]

South Konawe Regency is the highest number of preterm labors which is thought to be caused by several predisposing factors, namely pregnant women with the age of maternity mothers over the age of 35 years are found, thus researchers assume that to minimize the occurrence of premature labor it is necessary to provide an ongoing education program that coordinates with the local village government for marriage age requirements and family programs plan or BKKBN.

Parity is a Risk Factor for Preterm Labor at South Konawe Regency Hospital

The results showed that there was a significant relationship between the parity variable and the incidence of Preterm Labor, and among 116 respondents based on parity declared Preterm Labor and at risk there were 46 (79.31%) and of 116 respondents declared not Preterm Labor and not at risk amounted to 21 (36.21%). This states that respondents with Preterm Labor are more found due to parity I and parity factors in ≥ IV compared to respondents who are not Preterm Labor with parity II and III, with the results of epidemiological analysis obtained an OR value of 6.75 times where the lower threshold value is 2.94 and the upper threshold value is 15.50.

The incidence of preterm labor often occurs in mothers with a parity1 and often in mothers with parity ≥4, physiologically can be caused by scarring due to previous pregnancy and childbirth. Mothers of <2 parity or first parity will usually feel anxiety about their pregnancy. Pregnant women will think of ways to maintain the pregnancy and childbirth that will be faced. Anxiety that occurs will affect the development of the baby, so that the baby born will be at risk of premature labor.[11]

Based on research, mothers who have given birth to children four or more times are also very at risk of giving birth to babies with low birth weight, this is because many children born will cause uterine disorders, especially in terms of blood vessel function.[15] Parity of ≥4 mothers will be 2.4 times greater risk for giving birth to babies with low birth weight because each pregnancy and childbirth process experienced causes physical and psychological trauma, the more trauma experienced will cause complications in subsequent labor.[16]

High parity, namely parity >4 will affect the emergence of various health problems in mothers and babies born, repeated labor will have an impact on damage to blood vessels in the uterine wall and scar tissue that is repeatedly stretched due to pregnancy and childbirth will cause a deterioration in flexibility (elasticity) so that the scar tissue will result in reduced blood supply to the placenta and placenta becomes thinner and covers the uterus more widely. Women with high parity above four are risk factors for anemia in pregnancy, diabetes mellitus (DM), hypertension, malpresentation, placenta previa, uterine rupture, low birth weight and preterm labor, for premature babies have a risk of infant death due to unprepared organ systems to work properly.[17]

Preterm Labor is more likely to occur in the first pregnancy and delivery than subsequent pregnancies and deliveries, Pregnancy occurred already 10 years ago or a long delivery distance, since the last pregnancy, the mother has a family history of Preterm Labor, for example the mother or sister has experienced Preterm Labor, mothers over 35 years old, obesity in early pregnancy and

twin pregnancies have the potential to experience labor premature recurrence.[18],[19]

All women are at risk of Preterm Labor during pregnancy, childbirth, and puerperium. Preterm labor does not only occur in primigravida / primipara, in grandemultipara also has a risk for eclampsia. For example, in pregnant women and maternity more than three times. Excessive stretching of the uterus leads to excessive ischemia that can lead to Preterm Labor.[18] Furthermore, the proportion of maternity mothers who experienced preterm labor with risk parity was higher than the proportion of normal maternity with risky parity. Risk parity will have an impact on the risk of complications both during pregnancy and hildbirth, one of which is premature labor.[20]

South Konawe Regency is known to have a large population and the number of maternal and child mortality rates is high, known families with more than three children are found when compared to other regions, thus researchers assume the need to emphasize family planning programs to be more optimal for families to have a better quality of life, The right program in handling this problem is by improving program performance family planning or family planning program achievements, as well as supporting and improving government programs, one of which is KB Village.

History of Pregnancy Complications is a Risk Factor for Preterm Labor at South Konawe Regency Hospital

It is known that there is a significant relationship between the variable History of complications with the incidence of Preterm Labor. And among the 116 respondents based on the history of complications declared Preterm Labor and at risk there were 42 (72.41%) and of 116 respondents stated not to have Preterm Labor and not at risk amounted to 9 (15.52%). This states that respondents with Preterm Labor are more found due to historical factors of complications compared to respondents who are not Preterm Labor, it is known that the results of epidemiological analysis obtained an OR value of 14.29 times where the lower threshold value is 5.73 and the upper threshold value is 35.67.

Child birth complications are conditions where the life of the mother and or fetus she is carrying is threatened caused by direct interference during childbirth. Child birth complications often occur as a result of delays in handling childbirth, and are considered one of the causes of maternal death.[21]

As we know, preterm *birth* increases the risk of babies being born with various complications that can cause death. The quality of life of preterm babies is also different from that of full-term babies, considering the rudimentary formation of organs and systems in the body.[22]

Statistical data shows that premature birth occurs in mothers who have low socioeconomic status. This incident is a lack of care for pregnant women because they do not do antenatal care during pregnancy. Inadequate nutritional intake during pregnancy, infection of the uterus, and other obstetric complications are triggers for premature birth.[23]

Anemia during pregnancy means hemoglobin levels of less than 11 g / dL in the first and third trimesters of pregnancy, or less than 10.5 g / dL in the second trimester. Hyperemesis gravidarum is a symptom of excessive nausea and vomiting in pregnant women. It lasts up to 4 months of pregnancy and may worsen your general condition. The reason is not clear. It can be divided into three levels according to the severity of the symptoms.[22]

Pregnancy complications are health problems that occur during pregnancy. It could involve the mother's health, the baby's health or both.[24] Total number of pregnancies in a mother with a case of Preterm Labor.[25]

Factors that are thought to be associated with the incidence of these complications include age, education, nutritional status and economic status of maternity mothers, in this case affecting the occurrence of fetal growth and development.[26]

Research shows that with the Safe Motherhood Assessment, the concept of *Safe Motherhood* is an effort to save women so that their pregnancies and childbirths are healthy and safe, and give birth to healthy babies. Several things were found that were considered as the cause of complications in childbirth. These include low maternal health and lack of readiness to get pregnant, Less antenatal examination, Labor assistance and care in the period after early delivery is still lacking, The quality of antenatal services is still low and baby healers are not fully able to carry out high risk detection as early as possible, not all district hospitals as referral places from puskesmas have sufficient equipment to carry out essential obstetric functions.[17]

Chronic Energy Deficiency is a Risk Factor for Preterm Labor at South Konawe Regency Hospital

The results showed a significant relationship between the variable of chronic energy deficiency and the incidence of Preterm Labor, and among 116 respondents with chronic energy deficiency groups who were declared Preterm Labor and at risk there were 49 (84.48%) respondents and of 116 respondents who were declared not to have Preterm Labor and not at risk or not experiencing chronic energy deficiency totaling 11 (18.97%). This states that respondents with Preterm Labor are more found due to chronic energy deficiency factors compared to respondents who do not experience Preterm Labor, and the results of startistic analysis obtained an OR value of 23.26 times where the lower threshold value is 8.84 and the upper threshold value is 61.21.

Chronic Energy Deficiency measurement is detected by Upper arm circum ference measurement. According to the Ministry of Health of the Republic of Indonesia that the measurement of Upper arm circumference is one way to determine the risk of Chronic Energy Deficiency. Upper arm circumference measurement cannot be used to monitor changes in nutritional status in the short term. Upper arm circumference measurement is used because the measurement is very easy and can be done by anyone. The threshold for Upper arm circumference with Chronic Energy Deficiency risk in Indonesia is 23.5 cm. If the size of the Upper arm circumference is less than 23.5 cm or in the red part of the Upper arm circumference band, it means that the woman has a risk of Chronic Energy Deficiency, and is expected to give birth to a low birth weight.[27]Give birth to a low birth weight has a risk of death, malnutrition, growth disorders, and impaired child development.[28]

Chronic Energy Deficiency often occurs in women of childbearing age and in pregnant women. Factors that affect Chronic Energy Deficiency in pregnant women are divided into two, namely internal and external factors. Internal factors (individual/family) are genetic, obstetric, and sex. While external factors are nutrition, medicine, environment, and disease.[29]

Nutritional status affects the incidence of Chronic Energy Deficiency, some of the nutrients that the body hunts during pregnancy, namely magnesium which functions in regulating body temperature, synthesis of nucleic acids and proteins, and maintenance of electrical potential in nerves and muscle membranes. Ionized and total magnesium levels have been shown to decrease with increasing gestational age. Insufficient magnesium intake is common in pregnant women and magnesium deficiency during pregnancy is associated with a higher risk of chronic hypertension, preeclampsia, placental dysfunction, and preterm labor.[30]

The nutritional status of the mother before and after pregnancy can affect the growth of the fetus that is being conceived. If the nutritional status of a pregnant woman is normal, it can be at the time before and during pregnancy will most likely give birth to a healthy, full-term baby with a normal weight. The quality of the baby born depends largely on the nutritional state of the mother before pregnancy and during pregnancy a mother will give birth to a healthy baby if her health and nutrition levels are in good condition.[31],[32]

The tightness of a pregnant woman's body that is more or less than the average body weight for a certain age is a factor to determine the amount of food substances that must be given so that her pregnancy runs smoothly. In developed countries weight gain during pregnancy is about 12-14 kg. If the mother is malnourished, the increase is only 7-8 kg with the result that it will give birth to a baby with low birth weight. Weight gain during pregnancy is around 10-12 kg, where in the first trimester the gain is less than 1 kg, the second trimester is about 3 kg, and the third trimester is about 6 kg. This weight gain also aims to monitor fetal growth.[25]

Chronic Energy Deficiency occurs because the body lacks one or several types of nutrients needed. Some things that can cause the body to lack nutrients include the amount of nutrients consumed is lacking, low quality, or both. The nutritional status of the mother before and during pregnancy can affect the condition of the mother and the growth of the fetus being conceived. As a result, pregnant women have a greater risk of giving birth to babies with low birthweight, death during labor, bleeding, difficult labor processes because they are weak and easily experience health problems

Chronic Energy Deficiency prevention measures related to energy consumption are to consume foods that are varied and sufficient in calories and protein including staple foods such as rice, sweet potatoes, and potatoes every day and foods containing protein such as meat, fish, eggs, nuts or milk at least once a day. For body burning,

the formation of new tissues, saving protein if power sources are lacking, protein can be used as a reserve to meet energy needs.

Based on research and field facts, it is known that the cause of pregnant women with chronic energy deficiency is due to low nutritional consumption in pregnant women due to the impact of low income or income, this can be justified by the high poverty rate in South Konawe Regency. Thus, as an effort to prevent the occurrence of Chronic Energy Deficiency in pregnant women, in addition to providing education related to cheap foods with high nutritional value such as the management of food ingredients from green vegetables, providing protein intake from eggs and fish with a frequency of at least 3 times a week as a prevention of low nutrition in pregnant women which has an impact on birth, high risk of pregnancy and childbirth, including premature labor and getting a baby with a better quality of life. Another thing is also the need to achieve the Nutrition program at the South KonaweRegency Health Office by coordinating related parties, especially for local governments in socializing the importance of nutrition for pregnant women.

Conclusion

Based on the results of research and discussion, it can be concluded as follows:

1. The mother's age is 5.88 times the incidence of Preterm Labor at South Konawe District Hospital
2. Parity is 6.75 times the incidence of Preterm Labor at South Konawe District Hospital
3. History of pregnancy complications is 14.29 times the risk of preterm labor at South Konawe District Hospital
4. Chronic Energy Deficiency has a 23.26-fold risk of Preterm Labor at South Konawe District Hospital

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