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Submission date: 18-Aug-2022 05:15PM (UTC+0800)
Submission ID: 1883884454
File name: artikel-Risk_Factors.pdf (239.8K)
Word count: 3433
Character count: 18294

Risk Factors as an Indicator of Non-Complications Spontaneous Preterm Birth: a Study in Eight Hospitals

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Abstract

To determine the indicator and identify risk factors for noncomplicated spontaneous preterm birth

A case-control study analysis on 276 mothers after spontaneous preterm and aterm birth were eight hospitals in Indonesia.

Among 28 risk factors, we found six most significant risk factors including a novel indicator, Edinburgh Postnatal Distress Scale (OR 6.66, CI 95%:1.36-32.56, p <0.001 for a severe score >13 and OR 6.15, CI 95%:2.06-18.34, p <0.001 for moderate score 10-12). The difference with previous publications, the number of children especially primipara had a significant risk to occur preterm birth (OR 3.77, CI 95%:1.79-7.92, p <0.001), in addition to multipara (OR 7.01, CI95%:3.06-16.05, p <0.001). We also determined that the mother have weightlifting work >5 hr/day (OR 5.41, CI 95%:2.33-13.54, p<0.000), low social economy status (OR 2.70, CI 95%:1.40-5.19, p.0.003) and Mid Upper Arm Circumference <23.5 cm (OR 3.71, CI 95%:1.30-10.53, p<0.014) were the indicators. The highest OR to occur preterm birth was a history of ever 1-2/>2 times preterm birth (OR 16.26, CI 95%:1.71-154.37, p<0.015).

We revealed the six indicators of risk factors for a spontaneous preterm birth that may help decision-making in determining an early intervention that measures in both early treatments.

Clinical article (J Int Dent Med Res 2020; 13(1): 395-399)

Keywords: Indicator, Non-complication, Preterm birth, Risk factors, Spontaneous.

Received date: 19 May 2019 **Accept date:** 02 September 2019

Introduction

Preterm birth according to WHO is birth that occurs between gestational ages of 28 weeks to less than 37 weeks (259 days) which was calculated from the first day to the last menstrual period in the 28-day cycle.[1] Preterm birth is the main causes of infant mortality and the second cause of death after pneumonia in children under five years and still a problem in the worldwide including Indonesia related to the prevalence, perinatal morbidity, and mortality.[2]

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Indonesian preterm birth incidence ranks are the five largest from 184 countries in 2010 [5] that can be reflected roughly by the incidence of low birth weight infants (LBW). LBW in Indonesia in 2013 was 10.2% [6], and in 2015 amounted to be 13.03% [7], while the results of the 2015 Intercensal Population Survey (SUPAS) showed that IMR in Indonesia was 22.23/1,000 Life Birth (LB), a number that reached the 2015 MDGs target of Ministry of Health Republic of Indonesia (23/1,000 LB). It is concordance with the realization of the performance of the East Java Provincial Health Office 2015 and 2016 that the number of IMR was 24.00/1000 LB and 23.60/1000 LB, respectively (East Java Health Office, 2016). However, the next analysis based on the distribution of IMR in East Java Province by Regency/City for the last five years, East Java had the highest average IMR from 2012-2016 compared to other Regencies/Cities.[8]

Prevention of health risks in pregnant, maternity and birth need to be carried out by early detection and monitor what causes maternal and infant mortality from physical examination and laboratory.[9] Therefore, every pregnant must be able to easily access health facilities for getting services according to standards, including the detection of possible diseases associated with a negative impact on maternal health. As an important component in health services; the history, laboratory and physical examination results are used to determine diagnosis, administer medication, monitor treatment outcomes and determine prognosis. Thus, it is expected that all the results examination are correct and accurate will contribute to reducing maternal mortality during pregnancy, maternity, and birth.[10] While morbidity rates, especially preterm birth can be reduced by prevention such as early and accurate predictions, interventions to eliminate risk factors and delay the occurrence of birth with the tocolytic administration, corticosteroids for fetal lung maturation, and prophylactic antibiotics.[11]

Materials and methods

An observational analysis was used in this study which determines the risk factors for preterm birth based on the results of clinical examinations. We designed as a case-control study by using primary and secondary data.[13] We included subjects were preterm birth mothers (28-37 weeks) which had medical records in eight hospitals including Soewandhi Hospital, Universitas Airlangga Hospital, Islam Jemur Sari Hospital, Sidoarjo Hospital, Madiun Sogaten Hospital, Jombang Hospital, Gresik Hospital, and Ngawi Hospital.

The inclusion criteria were preterm birth mothers (28-<37 weeks), preterm birth mothers less than 6 hour-3 days after childbirth, maternal age between <20 and >35 years, spontaneous single pregnancy without complications, healthy body and having a Mother and Child Health (MCH) record book. While, the exclusion criteria were Birth with complications or abnormalities and the instrument used in this study was a data collection sheet in the form of a questionnaire. A multivariate logistic regression model was used to count the odds ratios (OR). All determinants with P values of <0.25 were include together into the full logistic regression model, and the model was diminished by excluding variables with P values of >0.25. The OR and CI 95% were used to determine the risk. A P value of <0.05 was accepted as statistically significant.[14] The SPSS statistical software package version 18.0 (SPSS, Inc., Chicago, IL) was used for all statistical analyses.

Results

Sociodemographic Characteristics

We included 276 respondents consisted 129 mothers of spontaneous preterm birth and 147 mothers with aterm birth from eight hospitals in East Java. Among 28 variables, 18 variables eligible to become candidates in the multiple logistic regression analysis including <20 or >35 years of maternal age (63,22.8%, p <0.011), education <high school was (114,41.3%, p.0.012), occupation of maternal as housewife was (157,56.9%, p <0.105), number of children i.e first children and >2 people was (105,38.1% and 81,29.3%, p <0.001), pregnancy period <2 years (148,53.6%, p <0.436), weightlifting work <5 hours/day (214,77.5%, p <0.001), unsmoking mother (236,85.5%, p <0.014), EPDS with light score 0-9 was (238,86.2%, p <0.001), fetus moves >4 times/half hour (216, 78.3%, p <0.002), total sleep time 7-8 hours/day (149,54.0%, p <0.001), number of visits during pregnancy >4 visits (248, 89.9%, p <0.001), mothers who did not have a history of premature (256,93.55%, p <0.000), good socio-economic (182,65.9%, p <0.001), a son in previous pregnancy (143,51.8%, p <0.218), height >145 cm totaled (266,96.4%, p <0.001), BMI <18.5/> 35 Kg/m^2 by (145,52.5%, p <0.001), MUAC >23.5 cm totaled (235,85.1%, p <0.001), fundus uteri weight was not suitable for gestational age was (275,99.9%, p <0.001), Fetal heart rate was normally normal p <0.238, and more mothers who did not undergo bacterial vaginosis examination were (267, 96.7%, p <0.007).

Indicators

Multivariate analysis determined the risk factors for spontaneous preterm birth without complications. Among 18 variables, only 6 significant variables eligible as an indicator of the risk of preterm birth including the number of children with value p <0.001 for first children (OR 3.77, CI 95%: 1.79-7.92) and >2 children (OR 7.01, CI 95%: 3.06-16.05), weightlifting work >5 hr/day value (OR 5.41, CI 95%: 2.33-13.54, p

<0.001), EPDS value p <0.001 for Heavy score >13 (OR 6.66, CI 95%: 1.36-32.56) and Moderate score 10-12 (OR 6.15, CI 95%: 2.06-18.34), social economy status (OR 2.70, CI 95%: 1.40-5.19, p <0.003), history of ever 1-2/>2 times preterm birth (OR 16.26, CI 95%: 1.71-154.37, p <0.015), and MUAC <23.5 cm (OR 3.71, CI 95%: 1.30-10.53, p <0.014).

Discussion

In this study, we found that EPDS include the indicator to occur preterm birth for a big score >13 and Moderate score 10-12, although in other studies EPDS was only become a risk factor. The EPDS is very good to use for 1-16 weeks postpartum women that have used these screening tools to be reliable and sensitive in detecting depression, contains what postpartum women feel during the previous seven days by choosing one of four responses that are felt closest to them at the time. Which was developed by a study in 214 pregnant women was assessed every two months of gestation. They found that higher depression scores in early pregnancy are proven to predict anxiety and higher stress values in late pregnancy.[15] In other research, they found that EPDS identified early in the postpartum period such that secondary preventive interventions may be implemented in refugee, asylum-seeking, non-refugee immigrant, and Canadian-born women.[16] Stress scores that increase during mid-pregnancy predict higher anxiety scores at the end of pregnancy. This shows that the level of symptoms of depression, anxiety, and stress varies with increasing gestational age. Increasing depression early in pregnancy is very important, not only predicts symptoms of depression but also increases anxiety and stress in late pregnancy, so early emotional health screening is very important to prevent abnormalities during pregnancy.[17]

The number of children for first children (primiparous) and >2 children (multipara) were also included as an indicator. Maybe it is related to the amount of parity was one predisposing factor that occurs prematurely and possibly affects the state of maternal health in pregnancy. It was primiparous to mothers to have a greater incidence of preterm birth by 9.5% compared to multiparous mothers by 7.5% or the mother age by 20-40 years old in single pregnancy to have risk preterm birth by 51% compared to multiparous mothers by 20%.[18] This due because in fact that multiparous mother will found more information to prevent the risk that occurs in the next pregnancy on the based experience of the previous pregnancy, so it can reduce risk in subsequent pregnancy. The gestational distance showed that the short interval between last pregnancy with subsequent pregnancies (<6 months) has been a double risk factor for the risk of preterm birth in subsequent pregnancies [19] and the optimal pregnancy distance between the last pregnancy and the previous pregnancy was 18-23 months.[4]

In this study, we found was the highest of OR value is a history of previous preterm birth, this due supporting in several studies that mothers who have a history of previous preterm labor are risk factors for threatening preterm labor by 17.8 times greater than mothers who do not have a history of previous preterm birth in Indonesia.[20] And in the same similar study that mothers who have a history of 1 time preterm labor at 23-27 weeks' gestation have a higher risk of recurring preterm labor in the second pregnancy at 22.1 times . While mothers who have a history of 2 preterm labor will experience a third risk of recurring preterm labor at 21-31 weeks of gestation by 57%, while 32-36 weeks of gestation at 33% [12] and 34-36 6/7 weeks gestation to risk 9 times to have a late preterm birth on multiple gestation.[21] In Indonesia, preterm birth causes a large and significant impact on health costs, both directly and indirectly. Direct impacts include draining parents' health, financial, emotional and psychological resources. The indirect impact that occurs is the burden on the community for long-term care for sequelae due to prematurity and loss of livelihood of parents who are forced to stop working to care for their children.[11]

Mothers who had been weightlifting work during pregnancy were more at risk for preterm birth than those who did not.[22] In other research conducted also shows that first-trimester pregnant women who work with high physical workload were two times to risk for preterm birth (gestational age 33-36 weeks) and very preterm birth (22-32 weeks gestational age).[23] This was because maternal workload can be affected by stress levels, depression, and maternal anxiety caused by several types of maternal work at work the place.[24] In the third trimester, workload >42 working hours/week, >6 standing hours/day and

exposed to pesticides related to preterm birth and physically demanding jobs, long periods of time and night workers also have the potential for preterm birth.[4]

MUAC correlated with maternal energy and protein intake had a significant positive correlation with body weight, body length, leg length, infant's head circumference and chest circumference, i.e calorie intake and protein intake in women who give birth to premature babies [25] and the risk of preterm birth was higher in mothers who have MUAC ≤250 mm and show 1,2 times to risk less nutrition.[26] This due because the mothers had BMI <18.5 Kg/m^2 to risk 1.2-1.6 times, over 25-29.99 Kg/m2 to risk 0.8 times, or obesity BMI >35 Kg/m^2 also increase around 1.5-1.8 times to risk preterm birth than body weight normal women.[27, 28]

The numbers of samples in this study were relatively low, certainly becomes the limitation in this study. Recently, we are continuing surveys to add the sample numbers and expand to other islands. In addition, we included mothers from 8 hospitals in six cities/suburban east java with postpartum spontaneous preterm birth. Therefore, our results cannot be generalized across Indonesia.

Conclusions

The highest prevalence of mothers with spontaneous preterm birth was found in Jemur Sari Hospital and the lowest was in Madiun Hospital. The characteristics of maternal risk factors from 18, only 6 has significant risk factors.

Acknowledgements

The authors wish to thank and acknowledge, first; The Kementerian Riset, Tekhnologi dan Pendidikan Tinggi Indonesia (Kemenristekdikti RI) for generously supporting this project, second; to thank for of all midwife from Soewandhi hospital, Universitas Airlangga hospital, Islam Jemur Sari hospital, Sidoarjo hospital, Madiun Sogaten hospital, Jombang hospital, Ibnu Sina Gresik hospital, and Ngawi hospital on the support of the volunteers and data collection team.

AUTHOR CONTRIBUTIONS

Conception and design of study; Sriyana Herman, Budi Santoso, Hermanto Tri Joewono, Agus Sulistyono, acquisition of data; Hari Basuki, Sriyana Herman, analysis and interpretation of data; Hari Basuki, Sriyana Herman, M. Miftahussurur, drafting the manuscript; Sriyana Herman, Budi Santoso, Hermanto Tri Joewono, Agus Sulistyono, revising the manuscript critically for important intelectual content; the manuscript; Sriyana Herman, Budi Santoso, Hermanto Tri Joewono, Agus Sulistyono, approval of the version of the manuscript critically to be published; Sriyana Herman, Budi Santoso, Hermanto Tri Joewono, Agus Sulistyono, Hari Basuki, M. Miftahussurur.

Declaration of Interest

The authors had no conflict of interests regarding with respect to the authorship and/or publication of this paper.

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