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Original Research

Siamese Pumpkin Juice (*Sechium Edule* (Jacq.) Sw) To Decreased Blood Pressure Of Postpartum Mother's Hypertension

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ABSTRACT

Background: Postpartum hypertension is Indonesia's second-highest cause of maternal death. The abundant Siamese pumpkin, commonly consumed and containing potassium (167.1 mg) and flavonoids, has a role as an antihypertensive. The proper, easy, and correct dosage must be found to utilize postpartum maternal hypertension therapy.

Methods: Quay's experiment research, randomized pretest-posttest with control group design, consisted of 3 research groups, consisting of 2 intervention groups and 1 control group. Intervention I juiced 501.3 mg once daily plus antihypertensive drugs, Intervention II juiced 584,85 mg once daily plus antihypertensive drugs, and control consumed antihypertensive drugs. The sampling technique used total samples with a retrieval time of 1.5 months and obtained 16 respondents in each group. The intervention begins on the first to the fifth day of the puerperium. Bivariate analysis of systolic and diastolic blood pressure using Repeated Measure Anova.

Results: The intervention group I significant decrease in systolic blood pressure and diastolic blood pressure (p -value 0.000) and intervention group II significant decrease in systolic blood pressure and diastolic blood pressure (p -value 0.000).

Conclusion: Formula Siamese pumpkin juice (584,85 mg) effectively decreased blood pressure in postpartum hypertension patients.

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INTRODUCTION

Hypertension is one of the health problems that cause high pain and maternal death. The initial causes of postpartum hypertension vary Marco et al., (2019) states that 50% of the incidence of hypertension during pregnancy persists in the puerperium (Marco, Catherine A, Thomas, Kelli, Rzecznik, 2019). 61.3% of deaths occur during the puerperium Hypertension causes 26.6% of pregnancy, 12.1% of labor, and 25.5% of pregnancy (Chambali et al., 2019). Indonesia's health profile report in 2019 stated the three highest causes of maternal death, namely bleeding (1,280 cases), hypertension in

pregnancy (1,066 cases), and infection (207 cases) (Kementerian Kesehatan Republik Indonesia, 2020).

Maternal mortality in Central Java in 2020 increased by 25.5%, most of it due to HDK. 61.3% occurred during the puerperium, 26.6% during pregnancy, and 12.1% during childbirth. The three districts with the highest death cases were Brebes, with 62 cases, Grobogan, with 31 cases, and Tegal, with 28 cases. HDK has become a maternal health issue in Tegal Regency from 2020 to 2022.

The treatment of hypertension during pregnancy and postpartum considers various essential things that occur during this time. One combination therapy was used, namely nifedipine and methyldopa, in cases of severe pre-eclampsia (Chambali et al., 2019; Nurmainah et al., 2021). Some studies state that using methyldopa in postpartum can affect mood and trigger postpartum depression (Ministry of Health (MOH), 2018). Utilization of natural ingredients in hypertension management, one of which is using beetroot and star fruit juice with a formulation of 30%:70%, can reduce the systolic mean of 20.46 mmHg and diastolic 3.4 mmHg, but beetroot is a fruit with a relatively high price, so that it cannot be consumed by all people (Retnaningsih & Wijayanti, 2020).

The NHLBI found the Dietary Approaches to Stopping Hypertension (DASH) diet's core. People should eat fruits, vegetables, and other foods rich in potassium, magnesium, calcium, protein, and fiber (National Heart, Lung, 2006). Siamese pumpkin contains potassium (167.1 mg) (Kementerian Kesehatan Republik Indonesia, (2021) and flavonoids that manage hypertension (J.Albarracín et al., 2010). The consumption of Siamese pumpkin juice research Fauziningtyas et al., (2020) has not shown an optimal decrease in blood pressure.

Siamese pumpkin has a relatively low selling value and is commonly consumed. The benefits of Siamese pumpkin in reducing high blood pressure must be felt by the community with easy processing and optimal results, so researchers designed a dosage formulation that could show an optimal decrease in blood pressure.

MATERIALS AND METHOD

This study used a quasi-experiment, randomized pretest-posttest with a control group design consisting of 3 research groups (2 intervention groups and one control group). Intervention I juice 501.3 mg 1 time a day + antihypertensive drugs, Intervention II juice 584,85 mg 1 time a day + antihypertensive drugs, and control consumed antihypertensive drugs. The concentration of Siamese pumpkin juice was increased from the research concentration of Rista et al. (12) to 60% and 70%. This research has been registered with the Health Research Ethics Commission of the Ministry of Health, Semarang No. 013/EA/KEPK/2022.

The study population was a postpartum mother who experienced hypertension and was treated by dr. Soeselo Slawi Hospital, Tegal Regency. The sampling technique was total sampling, with a data collection time of 1.5 months and 16 respondents in each group. The instruments used were respondents' characteristic sheets, PSAS questionnaires with validity test results (Pearson product-moment 0.77) and reliability (alpha Cronbach 0.95) Somerville et al., (2014), observation sheets, tools for blood sampling, and the EasyLite REF 2124 Na/K/Cl/Ca/Li analyzer. OMRON digital sphygmomanometer type HEM 7124 with guaranteed validity and tools for processing Siamese pumpkin juice.

RESULTS

The characteristics of respondents in this study are presented in the following table:

Table 1. Frequency Distribution of Respondents' Characteristics

| Characteristics | Group | | | | | | P ^a |
|---------------------------------------|---------|------|----------------|------|-----------------|------|--------------------|
| | Control | | Intervention I | | Intervention II | | |
| | n | % | n | % | n | % | |
| Age | | | | | | | |
| 21-35 years | 7 | 50 | 7 | 50 | 6 | 42,9 | 0,556 ^a |
| 36-49 years | 7 | 50 | 7 | 50 | 8 | 57,1 | |
| Education | | | | | | | |
| SD | 8 | 57,1 | 8 | 57,1 | 9 | 64,3 | 0,068 ^a |
| SMP | 3 | 21,4 | 5 | 35,7 | 4 | 28,6 | |
| SMA | 1 | 7,1 | 1 | 7,1 | 1 | 7,1 | |
| PT | 2 | 14,3 | 0 | 0 | 0 | 0 | |
| Work | | | | | | | |
| Work | 1 | 7,1 | 1 | 7,1 | 2 | 14,3 | 0,369 ^a |
| Doesn't work | 13 | 92,9 | 13 | 92,9 | 12 | 85,7 | |
| IMT | | | | | | | |
| Normal (18,5-25) | 3 | 21,4 | 3 | 21,3 | 1 | 7,1 | 0,496 ^a |
| Fat ($\geq 25,1$) | 11 | 78,6 | 11 | 78,1 | 13 | 92,9 | |
| Parity | | | | | | | |
| Primipara | 6 | 42,9 | 4 | 38,6 | 2 | 14,3 | 0,652 ^a |
| Multipara | 6 | 42,9 | 8 | 57,1 | 8 | 57,1 | |
| Grande multipara | 2 | 14,3 | 2 | 14,3 | 4 | 28,6 | |
| Anxiety | 14 | 100 | 14 | 100 | 14 | 100 | 0,189 ^a |
| Types of Childbirth | | | | | | | |
| Pervaginam | 5 | 35,7 | 7 | 50 | 10 | 71,4 | 0,243 ^a |
| <i>Sectio Caesarea</i> | 9 | 64,3 | 7 | 50 | 4 | 28,6 | |
| History of HDK | | | | | | | |
| Yes | 10 | 71,4 | 9 | 64,3 | 6 | 42,9 | 0,348 ^a |
| No | 4 | 28,6 | 5 | 35,7 | 8 | 57,1 | |
| Family History of Hypertension | | | | | | | |
| Yes | 7 | 50 | 4 | 28,6 | 10 | 71,4 | 0,244 ^a |
| No | 7 | 50 | 10 | 71,4 | 4 | 28,6 | |

^a Levene Test: Homogeneity of variances * level of significance sig >0,05

Table 1 presents the distribution of characteristics and results of the Levene test. Statistically, the proportion of respondents' characteristics between intervention groups

I, II, and controls were homogeneous or there was no significant difference with p-values >0.05 at age characteristics of 0.556, education 0.068, occupation 0.369, BMI 0.496, parity 0.652, anxiety 0.652, type of childbirth 0.243, history of HDK 0.348, and family history of hypertension 0.244. The age variable describes the highest age at the ages of 36-49 and 21-35, namely 7 respondents (50%) in intervention I and control, but it is different from intervention II, with a total of 8 respondents (57.1%) at the age of 36-49.

The education variable shows that all respondents in the three groups are dominated by respondents with an elementary education background. All respondents in the three largest research groups do not work. The BMI in all three study groups was obese. The parity variable describes the respondents with the same number of birth categories, namely 6 respondents (42.9%) primiparous and 6 respondents (42.9%) multiparous in the control group, while in intervention groups I and II, most of the respondents were in the multiparous category. birth, namely 8 respondents (57.1%).

The type of delivery in the control group was dominated by cesarean delivery. Intervention group I had 6 respondents by vaginal delivery and 6 other respondents by cesarean section, but intervention group II, was dominated by vaginal delivery, with as many as 10 respondents (71.4%). The history of HDK in the control and intervention groups I, which was dominated by respondents, had a history of distribution of 10 respondents (71.4%) and 9 respondents (64.3%), in contrast to the intervention group II, which was dominated by no history of HDK and as many as 8 respondents (57.1%). In the control group, 7 respondents (50%) had a history and 7 respondents (50%) had no history.

In intervention group I there were 10 respondents (71.4%) who had no history, but in intervention group II there were 10 respondents (71.4%) who had a history.

Table 2. Normality and Homogeneity Test of Systolic and Diastolic Blood Pressure

| Variable | Group | | | | | | | | P ^a | |
|--------------------------|--------------|---------|--------------------|----------------|---------|--------------------|-----------------|---------|--------------------|--------------------|
| | Control | | P ^b | Intervention I | | P ^b | Intervention II | | | |
| | Mean±SD | Min-Max | | Mean±SD | Min-Max | | Mean±SD | Min-Max | | |
| Systolic Pretest | | | | | | | | | | |
| Posttest1 | 150,86±6,916 | 142-167 | 0,369 ^b | 151,14±11,231 | 140-178 | 0,054 ^b | 158,79±9,553 | 143-180 | 0,840 ^b | 0,310 ^a |
| Posttest 2 | 149±8,209 | 138-165 | 0,183 ^b | 147,64±11,084 | 135-175 | 0,104 ^b | 153,14±8,328 | 140-170 | 0,753 ^b | 0,534 ^a |
| Posttest 3 | 145,07±8,965 | 135-163 | 0,075 ^b | 142,64±8,590 | 133-163 | 0,139 ^b | 144,86±5,260 | 138-155 | 0,285 ^b | 0,239 ^a |
| Posttest 4 | 141,36±8,509 | 130-161 | 0,055 ^b | 151,14±11,231 | 130-155 | 0,692 ^b | 136,93±7,043 | 126-150 | 0,733 ^b | 0,959 ^a |
| Posttest 5 | 138±8,171 | 126-156 | 0,082 ^b | 133,86±4,769 | 125-144 | 0,645 ^b | 132,14±5,709 | 125-146 | 0,081 ^b | 0,368 ^a |
| | 133,93±6,545 | 125-150 | 0,163 ^b | 129,07±4,428 | 124-140 | 0,098 ^b | 126,29±4,177 | 121-135 | 0,131 ^b | 0,222 ^a |
| Diastolic Pretest | | | | | | | | | | |
| Posttest1 | 100,71±5,757 | 90-110 | 0,478 ^b | 97,79±7,708 | 87-110 | 0,398 ^b | 93,83±7,968 | 80-111 | 0,084 ^b | 0,589 ^a |
| Posttest 2 | 97,29±5,312 | 89-105 | 0,347 ^b | 94,07±8,544 | 80-112 | 0,831 ^b | 96,29±5,863 | 88-104 | 0,059 ^b | 0,089 ^a |
| Posttest 3 | 90,93±5,298 | 82-100 | 0,103 ^b | 85,14±7,177 | 76-98 | 0,129 ^b | 90,79±8,577 | 78-105 | 0,294 ^b | 0,165 ^a |
| Posttest 4 | 87,21±5,605 | 78-98 | 0,986 ^b | 85,21±4,577 | 78-96 | 0,214 ^b | 88,57±9,154 | 77-110 | 0,074 ^b | 0,196 ^a |
| Posttest 5 | 86±5,262 | 78-96 | 0,306 ^b | 85,57±3,031 | 79-89 | 0,103 ^b | 85,29±5,567 | 77-95 | 0,467 ^b | 0,245 ^a |
| | 86,50±3,737 | 80-95 | 0,654 ^b | 82,43±3,502 | 77-91 | 0,397 ^b | 80,93±5,916 | 67-90 | 0,327 ^b | 0,106 ^a |

^a Levene Test: Homogeneity of variances *level of significance sig >0,05

^b Shapiro-Wilk: Test of normality *level of significance sig >0,05

Table 2 shows the results of the data normality and homogeneity tests on variable potassium, systolic blood pressure, and diastolic levels in intervention groups I, II, and controls, with p-values greater than 0.05 indicating that all data on each variable were normally distributed and there was no meaningful difference prior to treatment (homogeneous). Based on the normality and homogeneity of the data, bivariate and multivariate analyses can be carried out using parametric tests.

Systolic Blood Pressure Analysis

Table 3. Differences in Systolic Blood Pressure of Postpartum Hypertensive Mothers

| Systolic Blood Pressure | Control | | Intervention I | | Intervention II | |
|---------------------------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|--------------------|
| | Δ Mean Difference | P-value | Δ Mean Difference | P-value | Δ Mean Difference | P-value |
| Δ Pre-Post 1 | 1,857 | 1,000 ^a | 3,500 | 0,009 ^a | 5,643 | 0,016 ^a |
| Δ Pre-Post 2 | 5,786 | 0,032 ^a | 8,500 | 0,000 ^a | 13,929 | 0,000 ^a |
| Δ Pre-Post 3 | 9,500 | 0,000 ^a | 11,286 | 0,001 ^a | 21,857 | 0,000 ^a |
| Δ Pre-Post 4 | 12,857 | 0,000 ^a | 17,286 | 0,000 ^a | 26,643 | 0,000 ^a |
| Δ Pre-Post 5 | 16,929 | 0,000 ^a | 22,071 | 0,000 ^a | 32,500 | 0,000 ^a |
| Greenhouse-Geisser | | 0,000 ^b | | 0,000 ^b | | 0,000 ^b |

^a Poshoc Bonferroni * level of significance sig <0,05

^b Repeated Measure Anova (Test of Within-Subjects Effects) * level of significance <0,05

Table 3 presents the results of the Repeated Measure ANOVA statistical test. There is a decrease in the mean value of systolic blood pressure in the table on five consecutive days. The Greenhouse-Geisser's P-value in the three study groups was 0.000<0.05. This can be interpreted to mean a significant difference in the mean value of systolic blood pressure at each time.

The results of the Poshoc Bonferroni test showed a p-value of <0.05 in each measurement. It can be concluded that there was a difference in systolic blood pressure before the intervention from the first to the fifth day in the three research groups.

Diastolic Blood Pressure Analysis

Table 4. Differences in Diastolic Blood Pressure of Postpartum Hypertensive Mothers

| Diastolic Blood Pressure | Control | | Intervention I | | Intervention II | |
|---|--------------------------|--------------------|--------------------------|--------------------|--------------------------|--------------------|
| | Δ Mean Difference | P ^b | Δ Mean Difference | P ^b | Δ Mean Difference | P ^b |
| Δ Pre-Post 1 | 3,429 | 0,033 ^b | 3,714 | 0,118 ^b | 2,143 | 1,000 ^b |
| Δ Pre-Post 2 | 9,786 | 0,000 ^b | 12,643 | 0,000 ^b | 7,643 | 0,101 ^b |
| Δ Pre-Post 3 | 13,500 | 0,000 ^b | 12,571 | 0,000 ^b | 9,857 | 0,050 ^b |
| Δ Pre-Post 4 | 14,714 | 0,000 ^b | 12,214 | 0,003 ^b | 13,143 | 0,000 ^b |
| Δ Pre-Post 5 | 14,214 | 0,000 ^b | 15,357 | 0,000 ^b | 27,500 | 0,000 ^b |
| P^a Greenhouse-Geisser | | 0,000 ^a | | 0,000 ^a | | 0,000 ^a |

^a Poshoc Bonferroni * level of significance sig <0,05

^b Repeated Measure Anova (Test of Within-Subjects Effects) * level of significance <0,05

Table 4 presents the results of the Repeated Measure ANOVA statistical test. There is a decrease in the mean value of diastolic blood pressure in the table on five

consecutive days. The Greenhouse-Geisser's P-value in the three study groups was $0.000 < 0.05$. This can be interpreted to mean a significant difference in the mean value of diastolic blood pressure at each time.

The results of the Poshoc Bonferroni test showed that the entire measurement had a p-value of < 0.05 , so it can be concluded that there was a difference in diastolic blood pressure before the intervention from the first to the fifth day in the three study groups, but there were several measurements that showed a p-value of > 0.05 in the intervention group I, which occurred on the first day, and the intervention group II, which occurred on the first day to the third day.

DISCUSSION

This study showed that the percentage of characteristics of study respondents based on age was at most > 35 years by 57.1% in intervention group II. Still, age control of 21–35 years and > 35 years in the intervention group had the same percentage, namely 50%. Following the study Machano & Joho, (2020), 297 mothers aged 21–35 years and 66 mothers aged > 35 years experienced pre-eclampsia during the puerperium.

The educational status of the postpartum mother can indirectly affect her knowledge of health issues, such as the importance of doing an ANC. Postpartum mothers dominated the last academic status in these three study groups with the previous educational status at the elementary school level, namely 57.1% in intervention group I, 64.3% in intervention group II, and 57.1% in the control group. This follows research Hasija et al., (2021) which showed many adverse pregnancies in half of the high-risk women who performed ANC by observing the placenta profile. As many as 4.61% of mothers do not use health services, 8.2% do not do ANC, and 30.08% have poor ANC quality (Simbolon et al., 2015).

Work is one of the socio-economic indicators of the family and greatly affects health. Almost all puerperal mothers did not work, with a distribution of 92.9 % in intervention group I, 85.7 % in intervention group II, and 92.9 % in the control group. This follows the results of research Simbolon et al., (2015), which states that socioeconomic factors that are less able to be influenced by low educational status, rural housing, and low family incomes have been shown to affect low access to health services.

This study showed that the BMI of puerperal mothers was dominated by the obese category (> 25.1), with a distribution of 78.1% in intervention group I, 92.9% in intervention group II, and 78.6% in the control group. According to Roberts JM et al., excessive weight gain during pregnancy causes the formation of excess fat, so toxic substances derived from fat and oxidative pressure cause endothelial dysfunction, which impacts vasoconstriction and hypertension. In addition, continuous vasospasm triggers protein accumulation, causing pre-eclampsia and kidney failure (Nurmainah et al., 2021).

Breastfeeding can reduce BMI and affect other adiposity measures (Aleksandra Obuchowska, Arkadiusz Standyło, 2021). Still, in women who have already experienced pre-eclampsia, it is recommended to stabilize the BMI at around 18.5–25 before the subsequent pregnancy (NICE Guideline, 2019). This follows research (Takaoka et al., 2016) which states BMI before Pregnancy ≥ 25 is at risk of 3.3 times experiencing postpartum hypertension. This study showed that most mothers had given birth more than once and less than six times (multipara), with a percentage distribution

of 57.1 % in intervention groups I and II and 42.9 % in the control group. High parity can cause health problems for both the mother and the baby (Safita & Nur, 2020).

Anxiety in puerperal mothers can affect their quality of life in the puerperium and their adaptation to becoming a mother. The results showed that all puerperal mothers experienced anxiety symptoms with a mean of 87.50 in intervention group I, 98.43 in intervention group II, and 93.14 in control groups. Research Shay et al., (2020) states that 40% of pregnant women who experience anxiety or depression are at risk of experiencing HDK, and 30% experience it early in pregnancy.

The method of delivery that the mother goes through can indirectly affect the mother's emotions and trigger the occurrence of high blood pressure. The type of delivery experienced by puerperal mothers in this study varied. In intervention group I, as much as 50% of maternity mothers' pervaginam and SC. Intervention group II was dominated by pervaginal delivery with 71.4%, and the control group of 64.3% gave birth in SC. SC delivery was 6.9 times at risk of postpartum hypertension (Takaoka et al., 2016). In addition, mothers with HDK showed an SC surgery rate of 45.4 compared to women without HDK of 31.4% (Corrigan et al., 2021).

The results showed that almost all mothers had experienced HDK before, with a distribution in intervention group I of 64.3%, intervention II of 42.9%, and control of 71.4%. These results follow the study that pre-eclampsia is an independent predictor of hypertension in the puerperium. Research shows a history of hypertension before pregnancy is 19.382 times the risk and 3.12 times the risk of settling in the puerperium period. The experience of hypertension experienced in previous pregnancies can be repeated in future pregnancies and settle in the puerperium.

The characteristics of the family history of hypertension in this study varied. In intervention group I, 71.4% had no record, in intervention group II, 71.4% had an account; in the control group, 50% had a history. This follows research (Machano & Joho, 2020) which states a family history of hypertension is 6.13 times greater than experiencing postpartum hypertension.

In 25% of healthy postpartum mothers, physiologically there is a decrease in left ventricular systolic function, indicating impaired heart function. Placental hypoxia is thought to lead to activation of maternal vascular endothelium, stimulation of endothelin and superoxide production, increased vascular sensitivity to angiotensin II, and decreased formation of vasodilators such as nitric oxide. These endothelial abnormalities can cause vasoconstriction throughout the body, including the kidneys, playing an important role in the long-term regulation of arterial pressure.

The mean pretest and posttest systolic blood pressure in the intervention group I was 151.14 mmHg and 129.07 mmHg, with a mean decrease of 22.071 mmHg. With this decrease, it can be concluded that 501.3 mg of chayote juice can be given to respondents with an increase in systolic blood pressure <150 mmHg so that the administration of this juice can be optimal and reduce systolic blood pressure to normal. Different things happened in intervention group II, with a decrease of 32.5 mmHg and a mean value of pretest and post-test systolic blood pressure of 158.79 mmHg and 126.29 mmHg. From these results, it can be assumed that the optimal decrease in diastolic blood pressure can be achieved by giving 584.85 mg of chayote juice to the group of mothers with diastolic blood pressure <160 mmHg.

The results of statistical tests showed a decrease in systolic blood pressure on 5 consecutive days in the three study groups and obtained $p = 0.000$. This value showed a significant difference in the mean systolic blood pressure in each measurement. The

results of this study are almost equivalent to research regarding the consumption of beetroot and starfruit juice with a 3:7 formulation so that the juice in a 200 ml preparation can reduce systolic blood pressure by an average of 20.46 mmHg.

Siamese pumpkin contains potassium 167,1 mg Kementerian Kesehatan Republik Indonesia, (2021) and flavonoids that play a role in managing hypertension. The results of the concentration analysis showed the presence of potassium content in young and old Siamese pumpkins in both the flesh and seeds (Lage et al., 2019). This study's consumption of Siamese pumpkin juice increased the concentration of Siamese pumpkin.

Decreasing blood pressure due to potassium intake will be more pronounced in individuals with high salt intake (Palmer & Clegg, 2020). At the same time, flavonoids contain high antioxidants that play a role in endothelial function Clark et al., (2015), inhibit ACE, provide diuretic effects Nadila, (2014), activation of EDRF, and inhibit angiotensin I to II (Mutmainah & Estiasih, 2016; Wang et al., 2021). However, continuous monitoring and treatment of blood pressure needs to be carried out in the postpartum period to minimize the constant increase in blood pressure, especially in mothers diagnosed with pre-eclampsia.

The results of statistical tests showed a decrease in diastolic blood pressure on 5 consecutive days in the three study groups and obtained $p = 0.000$. This value indicates a significant difference in each measurement's mean diastolic blood pressure. The mean pretest and posttest diastolic blood pressure in the intervention group I was 97.79 mmHg and 82.43 mmHg, with a mean decrease of 14.071 mmHg. With this decrease, it can be concluded that 501.3 mg of chayote juice can be given to respondents with an increase in diastolic blood pressure <100 mmHg so that the administration of this juice can be optimal and reduce diastolic blood pressure to normal.

Different things happened in intervention group II, with a decrease of 16,143 mmHg and a mean value of pretest and post-test diastolic blood pressure of 93.83 mmHg and 90.93 mmHg. From these results, it can be assumed that the optimal decrease in diastolic blood pressure can be achieved by giving 584.85 mg of chayote juice to the group of mothers with diastolic blood pressure <100 mmHg. RSUD dr. Soedarso Pontianak used a combination therapy of nifedipine and methyldopa.

All respondents to this study were given antihypertensive therapy with nifedipine 10 mg and methyldopa 500 mg, as many as 42.32% of patients with severe pre-eclampsia. These data showed a decrease in systolic and diastolic blood pressure by 29.64 and 19.8 mmHg (Nurmainah et al., 2021). Despite this, the use of antihypertensive drugs during the puerperium should be a consideration concerning the breastfeeding process and the psychological adaptation of the mother. Methyldopa should be used cautiously in women at risk of postpartum depression Ministry of Health (MOH), (2018).

This study's results align with the study (Apriani et al., 2020). Giving Siamese pumpkin extract 400 mg containing 715,033 mg of flavonoids and 2.678% potassium can help reduce the systolic and diastolic blood pressure of *postpartum* hypertensive mothers by controlling the intake of potassium, sodium, and stress with $p = 0.010$. According to one study, the lactation process is associated with lower blood pressure in postpartum hypertensive mothers who are overweight. However, more research is needed to investigate the relationship between lactation and blood pressure.

The use of antihypertensive drugs during the puerperium should be a consideration related to the breastfeeding process. In addition, removing the placenta

can help lower blood pressure, considering the immunological theory that the mother experiences anti-body blocking of the placenta during the first pregnancy, causing pre-eclampsia (Arikah et al., 2020). The mechanism of hypertension is closely related to the functioning of a person's kidneys.

According to Unverdi S et al. (Gupta et al., 2019), postpartum hypertension should be evaluated concerning sustained proteinuria, persistent hematuria, or impaired renal function. A percutaneous kidney biopsy should be performed on women with positive signs of kidney disease. The study results of Cote AM et al. (POGI, 2016) stated that examining the ratio of proteins compared to creatinine can predict proteinuria well.

CONCLUSION

Formula siamese pumpkin juice 584,85 mg effective decreased blood pressure in postpartum hypertension. The concentration of Siamese pumpkin juice in this study was not carried out by organoleptic and chemical product tests. The nutritional intake of the respondents could not be controlled.

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Original Research

The Phenomenon Of Pregnant Women's Anxiety In Facing Labor

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ABSTRACT

Background: The delivery process is a natural event of conception in the form of a baby and placenta from the uterus that can cause anxiety. If anxiety in pregnant women is not managed properly, it will have an impact on the physical and psychological health of the mother and baby.

Methods: This study uses descriptive methods. The implementation of the research will take place in December 2021–May 2022 at PMB Lutfiana. A total of 40 maternity mothers during phase I was active were obtained through a total sampling technique. The data collection technique uses the STAI scale. Data analysis using descriptive analysis.

Result: The age characteristics of respondents aged 20–35 years included as many as 34 respondents (85%). The majority of low-educated elementary-junior high school students amounted to 21 respondents (52.5 %). The majority of respondents did not work, a total of 27 respondents (67.5%), and the majority of multiparous respondents amounted to 31 respondents (77.5%). The majority of maternity mothers' anxiety during the active phase was severe anxiety level, with 28 respondents (70%). The average anxiety score was 46.43, with 95% of the CI being at a score of 43.01-49.84.

Conclusion: The majority of anxiety levels in active phase maternity mothers are severe anxiety levels.

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INTRODUCTION

Childbirth is a phenomenon that every married couple looks forward to. However, when heading into the delivery process, pregnant women will feel mixed feelings. In addition to being impatient to see the baby born, the mother will also feel fear and anxiety in the face of her delivery (Maryunani, 2015). Anxiety experienced by mothers in labor can have an impact on both the delivery process and the fetus in the womb.

Anxiety is believed to be a common mental problem in pregnant women, including being more present in the third trimester of pregnancy. Higher levels of anxiety in the third trimester of pregnancy may be related to the closeness of childbirth, which is perceived by some pregnant women as a vulnerable moment and capable of triggering feelings of fear (Silva et al., 2017). The number of cases of postpartum depression, one of which is due to the unidentified psychological condition of pregnant women, is increasing.

Some pregnant women are not honest about the psychological conditions they experience. They feel happy and enjoy their pregnancy, but actually, they have a big problem that could affect their pregnancy. Anxiety that is not identified during pregnancy can have an impact on childbirth and can even make the mother experience postpartum depression (Silva, Nogueira, Clapis, & Leite, 2017).

The level of anxiety greatly affects the welfare of pregnant women and the fetus in the womb. Low levels of anxiety in pregnant women can reduce the complications caused

by it so that it can indirectly reduce maternal and infant mortality rates, while high levels of anxiety can aggravate complications of maternal and infant mortality rates (Siallagan & Lestari, 2018).

Research in Indonesia shows that pregnant women who experience high levels of anxiety can increase the risk of premature birth and even miscarriage. If this is allowed to happen, then the mortality and morbidity rates in pregnant women will increase (Astria, 2019) (Shodiqoh, 2014). The same thing was revealed by Hasim (2018) in his research, where anxiety in pregnancy, if not overcome as soon as possible, will have a negative impact on the mother and fetus.

Anxiety during pregnancy does not have a direct impact on death. But anxiety can result in a decrease in uterine contractions so that childbirth will increase for longer, an increase in the incidence of uterine atony, lacerations of bleeding, infections, maternal fatigue, and shock, while in babies it can increase the risk of premature birth and LBW. Previous research by Alexandra et al., (2019) showed that a history of mental health disorders, lack of social support, previous negative childbirth experiences, and *Mood of Delivery* (MOD) correlates with *Fear of Childbirth* (FOC) and *Post Traumatic Stress Disorder* (PTSD).

This study confirms the previous study where the results showed that the level of anxiety in respondents was moderate anxiety in as many as 14 respondents (43.8%), severe anxiety in 10 respondents (31.3%), mild anxiety in 6 respondents (18.8%), and did not have anxiety in 2 respondents (6.3%) (Frincia et al., 2018). This study aims to determine maternal anxiety during pregnancy, especially in the face of childbirth. After knowing the phenomenon of anxiety experienced by the mother in labor, the midwife can intervene so that the mother in labor can be more relaxed so that delivery takes place smoothly, naturally, and normally without any trauma.

Identifying anxiety through instruments to measure maternal anxiety during pregnancy can help pregnant women so that their anxiety does not get worse, which will have an impact on both the mother and the baby. The results of a preliminary study at PMB Lutfiana, Yogyakarta during August–October 2021 obtained data on the normal delivery of 20 patients. Of the 20 patients, 15 (75%) experienced anxiety on the eve of delivery. The high rate of anxiety experienced by maternity mothers can have an impact on the delivery process.

This is what prompted researchers to conduct research on maternal anxiety phenomena before delivery in order to identify the anxiety experienced by maternity mothers so that appropriate interventions can be made as a solution to overcome anxiety in maternity mothers.

MATERIALS AND METHOD

This type of research is carried out by a descriptive method with a cross-sectional approach. The cross-sectional design is a study to study the dynamic correlation between risk factors and effects, and all data can be taken over a period of time. The population in this study was all normal maternity mothers who gave birth in PMB Lutfiana. The sampling technique used was total sampling.

Given that the results of the study can be generalized and the calculation does not require a table of the number of samples, the number of samples must be made representative. Thus, the sampling in this study used the Slovin formula to obtain a sample that could represent the overall state of the object. This study used 40 physiological maternity mother subjects with an active phase of 4 cm to ≤ 7 cm who were willing to be respondents and follow the research procedure.

A tool for measuring anxiety in maternity mothers using the Y-1 STAI (The Spielberger State and Trait Anxiety Inventory) scale contains 20 items, where 10 items contain statements about anxiety (favorable) and 10 items contain no statements regarding anxiety (unfavorable). The variable in this study is a picture of the anxiety of the maternity mother before delivery during the active phase of labor.

RESULTS

The results of the characteristics of the study subjects showed 40 research subjects based on characteristics, frequency and percentage

Table 1. Characteristics of respondents in the facing of labor

| Background Characteristic Respondent | Frequency (f) | Percentage (%) |
|---|----------------------|-----------------------|
| Age | | |
| 20 – 35 | 34 | 85 |
| >35 | 6 | 15 |
| Education Level | | |
| Lower Education | 21 | 52.5 |
| Higher Education | 19 | 47.5 |
| Occupation | | |
| Working | 13 | 32.5 |
| Not Working | 27 | 67.5 |
| Parity | | |
| Primiparous | 9 | 22.5 |
| Multiparous | 31 | 77.5 |

Based on table 1, shows that the characteristics of respondents according to age in PMB Lutfiana are mostly aged 20–35 years, with a total of 34 respondents (85%). The level of education of respondents in PMB Lutfiana is mostly low education, starting from elementary-junior high schools, with a total of 21 respondents (52.2%). The characteristics of respondents according to employment at PMB Lutfiana show that the majority are not working, with a total of 27 respondents (67.5%).

The characteristics of respondents according to parity or number of pregnancies in PMB Lutfiana were mostly multiparous, with a total of 31 respondents (77.5%).

Table 2. Distribution of the incidence of anxiety in pregnant women in the face of labor

| Anxiety | Frequency (f) | Percentage (%) |
|----------------|----------------------|-----------------------|
| Mild anxiety | 10 | 25 |
| Severe anxiety | 30 | 75 |
| Total | 40 | 100 |

Based on table 2, it shows that the phenomenon of anxiety of pregnant women in facing labor during the active phase of labor at PMB Lutfiana the majority experienced severe anxiety as many as 30 respondents (75%).

Table 3. The relationship between age and anxiety in the face of labor

| Age | Anxiety | | | | Total |
|--------------|----------------|-----------|---------------|-----------|--------------|
| | Mild | | Severe | | |
| | n | % | n | % | % |
| 20-35 th | 9 | 22.5 | 25 | 62.5 | 85 |
| >35 th | 1 | 2.5 | 5 | 12.5 | 15 |
| Total | 10 | 25 | 30 | 75 | 100 |

Based on table 3 shows that the majority of the age of 20-35 years experience severe anxiety 25 respondent (62.5%).

Table 4. The relationship between education level and anxiety in the face of labor

| Education Level | Anxiety | | | | Total |
|------------------------|----------------|----------|---------------|----------|--------------|
| | Mild | | Severe | | |
| | n | % | n | % | % |
| Lower Education | 7 | 17.5 | 14 | 35 | 52.5 |

| Education Level | Anxiety | | | | Total |
|---|-----------|-----------|-----------|-----------|------------|
| | Mild | | Severe | | |
| | n | % | n | % | |
| (Primary school- Junior High School) | | | | | |
| Higher Education (high school-college) | 3 | 7.5 | 16 | 40 | 47.5 |
| Total | 10 | 25 | 30 | 75 | 100 |

Based on table 4 shows that respondents who have a higher level of education (high school-college) are more likely to experience severe anxiety, as many as 16 respondent (40%).

Table 5. The relationship between Occupation and anxiety in the face of labor

| Occupation | Anxiety | | | | Total |
|--------------|-----------|-----------|-----------|-----------|------------|
| | Mild | | Severe | | |
| | n | % | n | % | |
| Working | 2 | 5 | 11 | 27.5 | 52.5 |
| Not Working | 8 | 20 | 19 | 47.5 | 47.5 |
| Total | 10 | 25 | 30 | 75 | 100 |

Based on table 5 shows the respondent's occupation, the majority of working mothers experience more severe anxiety than others as much 19 respondent (47.5 %).

Table 6. The relationship between Parity and anxiety in the face of labor

| Parity | Anxiety | | | | Total |
|--------------|-----------|-----------|-----------|-----------|------------|
| | Mild | | Severe | | |
| | n | % | n | % | |
| Primiparous | 2 | 5 | 7 | 17.5 | 22.5 |
| Multiparous | 8 | 20 | 23 | 57.5 | 77.5 |
| Total | 10 | 25 | 30 | 75 | 100 |

Based on table 6 shows the respondent's parity multiparous were more likely to experience severe anxiety than others as much 23 respondent (57.5%)

DISCUSSION

The Relationship Between Age and Anxiety in The Face of Labor

The first pregnancy for a mother-to-be is a new journey marked by physical and psychological changes so that various psychological problems arise (Varney, 2018). In this study, the results revealed that the majority of the participants aged 20–35 years experienced severe anxiety in 25 respondents (62.5%). This means that the age of good maternity mothers who are in the risk category (> 35 years) and the non-risk category (20–35 years) do not have a significant influence on the level of anxiety of maternity mothers.

However, this is supported by the results of research conducted by Komariah (2017) that found the readiness of maternity mothers does not depend on their age, so age is not a factor that affects the anxiety of maternity mothers. Whether a person matures or not is not only based on age. Some are young, but she is ready to be a mother so as not to experience anxiety.

The results of a similar study by Musahib *et al* (2015) also strengthened the results of this study where the age factor of pregnant women before delivery at the Maternal and Child Health Clinic of the Mabelopura Health Center was statistically not related to the level of anxiety. This may be due to the uncontrolled interference factor that affects the level of anxiety, i.e., knowledge.

The Relationship Between Education Level and Anxiety in The Face of Labor

A person's level of education also determines whether it is easy to absorb and understand the knowledge about the labor process they have gained. Thus, the increasing gestational age approaching the maternal labor process can prepare mature psychology so that it can reduce the burden on the mother's mind (Janiwarty, 2013). In the results of this study, it was found that respondents with high education experienced severe anxiety, with a total of 16 respondents (60 %). This result is certainly not in line with the results of research conducted by Kotimaki et al., (2020) that showed lower-educated women are likely to have worse health status and habits and a higher risk for health problems during pregnancy, which can also contribute to anxiety and depression.

Mothers who have less knowledge will view the labor process as frightening. However, this does not mean that mothers with high levels of knowledge will not experience anxiety during pregnancy. The higher the education level of a person, the better he will be able to search for or receive information so that he will quickly understand the conditions and risks he faces. However, this state will cause the person to become more anxious (Deklava et al., 2015).

The results of Ni'mah's research (2018) also strengthen the results and theories used in the results of this study that third-trimester pregnant women who are low or highly educated have the same chance of anxiety in the face of childbirth because the anxiety that occurs does not only depend on the education they have but also depends on knowledge, interpersonal relationships, and family history.

The Relationship Between Occupation and Anxiety in The Face of Labor

Meanwhile, on job characteristics, the majority of working mothers experience more severe anxiety than others, as many as 19 respondents (47.5 %). The anxiety of people who work and do not work is certainly different. Individuals who do not work tend to have a lighter burden of mind than those who work, so the workload, which is one of the factors of anxiety in the individual, is not felt, but rather the anxiety felt tends to be caused by other factors.

Unlike the case with people who work, anxiety tends to be caused by the burden of work and the burden of household affairs. Working people tend to experience stress due to the workload they have (Murtiwiidayanti & Ikawati, 2021). This is reinforced by the results of Suyani's research (2020), where research shows that the majority of working pregnant women experience anxiety. In that sense, there is an element of necessity, so it is possible that the anxiety comes from the work itself and not from the process of preparation for childbirth.

The same is also in line with research conducted by Mayasari (2018) that shows one of the factors of anxiety for pregnant women is work. The workload that a person has, such as feeling incompetent in the world of work or feeling that he is unable to provide maximum work results, will trigger the emergence of anxiety in the individual.

The Relationship Between Parity and Anxiety in The Face of Labor

Parity levels have attracted the attention of many researchers in relation to maternal and infant health. It is generally said that there is a tendency for mothers with high parity to have mental and psychological readiness in the face of childbirth when compared to mothers with low parity (Pasaribu, 2014). But in fact, the results of this study showed that respondents with high parity levels (multipara) actually tended to feel severe anxiety in as many as 23 respondents (57.5%).

This is inconsistent with the theory expressed by Manuaba (2012) that in maternity homes, mothers with primigravida parity still do not have a shadow of what happens during childbirth and are often found feeling fearful because they often listen to stories about what will happen when the gestational age is getting closer to the time of delivery with the imagined scary delivery process. However, the results of this study are still in line with the theory expressed by Devi et al., (2018) that previous maternity experiences have a hand in influencing a mother's level of anxiety in facing the delivery process.

So it is possible that mothers who have been in labor before (multigravida) also experience anxiety because they are imagined to have had bad maternity experiences in the past and can also be influenced by the abnormal childbirth that multigravida mothers have experienced, which is also reinforced by the results of research by Fazdria and Harahap (2014) that shows anxiety increases as the risk factors are possessed, such as being too young or too old and too frequent pregnancies. The higher the parity, the more the mother will experience anxiety in the face of childbirth.

The Phenomenon and Impacts of Maternal Anxiety during the First Stage of the Active Phase of Labor

Childbirth is a phenomenon that every married couple looks forward to. For this reason, it is necessary to provide moral and material support that must be provided by the family, husband, and society for the welfare of the mother and fetus in her womb. However, when heading into the delivery process, pregnant women will feel mixed feelings. In addition to being impatient to see the baby born, the mother will also feel fear and anxiety in the face of her delivery (Maryunani, 2015).

The most commonly associated theory regarding childbirth anxiety is the pain felt by the mother during the labor process. The relationship between pain and anxiety is a positive correlation that is interconnected like a spiral whose tip is enlarged. The effect of anxiety on a spiral-like patterned pain whose tip is enlarged. The more advanced the labor process, the mother's feelings will become more anxious, and the anxiety causes more intense pain, and *vice versa* (Sariati, 2016).

When the mother in labor feels anxious, the body will spontaneously release catecholamine hormones (Hartati & Sumarni, 2017). The increase in this hormone will cause vasoconstriction of blood vessels so that it can increase maternal blood pressure, decrease blood flow to the uterus, decrease uteroplacental flow, and decrease uterine activity so that it can cause prolonged labor (Potter & Perry, 2019). Maternal psychopathological symptomatology during pregnancy constitutes a significant risk factor for the well-being of the newborn. In particular, both prenatal anxiety and depression negatively affect the clinical aspects of the labor experience and, indirectly, the APGAR index (Smorti *et al.*, 2021).

A prospective cohort study conducted by Shao *et al.*, (2020) suggested the result that excessive anxiety experienced by a pregnant woman can trigger the incidence of ADHD in boys (*Attention Deficit Hyperactivity Disorder*) through increased C-reactive protein activity in the placenta. In her research, she explained that boys whose mothers experienced excessive anxiety while pregnant at least in the last 2 trimesters tended to have significant mRNA expressiveness in MCP-1, CRP, and HO-1 compared to the group of boys where the mother did not experience excessive anxiety while pregnant. It is also stated that the reason for this is that the fetoplacental "relationship" in male babies tends to be more sensitive to exposure to cytokines and maternal inflammation than in female babies.

Not only that, the adverse effects of excessive anxiety on pregnant women when facing childbirth were also revealed by Ramos *et al.*, (2022) that pregnant women who experience excessive anxiety tend to have a shorter gestational age due to *corticotropin-releasing hormone* activity in the placenta. It is explained that an increase in pCRH occurs between the second and third trimesters compared to the beginning of pregnancy. In addition, a sharper increase in pCRH from the beginning of pregnancy to the third trimester of pregnancy can be triggered by excessive anxiety. High levels of pCRH in the placenta can "ripen" all conception results systematically and lead to a shorter gestational age. Generally, this event is called *the pregnancy clock* (Ramos *et al.*, 2022).

Therefore, when the mother who is giving birth is in a comfortable, relaxed state, all the layers of muscles in the womb will work together in harmony as they should. That way, the delivery will run smoothly, easily, and comfortably. If the body and mind can feel comfort, then more constructive and positive thoughts can appear. A positive spike in maternity mothers' confidence is indispensable in childbirth because it can foster the self-

confidence and mentality necessary to create the possibility of an uncomplicated delivery opportunity (Indrayani, 2013).

The presence of a delivery companion can provide a sense of comfort, security, enthusiasm, and emotional support and can encourage the mother. The companion should play an active role in supporting the maternity mother. The supportive treatment action is in the form of rubbing the mother's back or holding her hand, maintaining eye contact, and convincing the maternity mother that they will not leave it alone (Nurul Hikmah, 2019).

The existence of a delivery companion can cause feelings of pleasure, which will be an impulse to the neurotransmitter in the limbic system, then passed on to the amygdala and then to the hypothalamus so that there is excitation in the ventromedial nucleus and the surrounding area, which can cause a feeling of calm and finally anxiety decreases so that the mother feels comfortable (Wati, 2015).

CONCLUSION

34 respondents (85%). The level of education of respondents in PMB Lutfiana is mostly low education, starting from elementary-junior high schools, with a total of 21 respondents (52.2%). The characteristics of respondents according to employment at PMB Lutfiana show that the majority are not working, with a total of 27 respondents (67.5%). The characteristics of respondents according to parity/number of pregnancies in PMB Lutfiana were mostly multiparous, with a total of 31 respondents (77.5%).

The suggestion for health workers, especially midwives, is that in carrying out services, they should always measure anxiety at the time of delivery so that interventions can be made to reduce maternal anxiety during childbirth. It is hoped that midwives will improve skills in an effort to assist childbirth without anxiety. Researchers are further encouraged not only to make this study a reference source but to expect to do more research by using different variables so that other factors of anxiety levels which can affect the birth process can be known. The samples can also be reproduced, so the research is more valid. The data collection process can also be done by using different techniques.

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Original Research

Effectiveness Of Dates Extract And Oxytocin Massage On Increasing Breast Milk Production For Breastfeeding Mothers

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ABSTRACT

Backgrounds: *The problem of insufficient breast milk production causes stress for mothers and hinders exclusive breastfeeding programs. This study aims to see how breastfeeding mothers can produce breast milk when they consume date extract and are given oxytocin massage.*

Methods: *This study used an experimental research design (posttest with control group design), with a purposive sampling technique, inclusion and exclusion criteria, and the inclusion criteria were drawn for grouping. The control group was breastfeeding mothers given oxytocin massage only, while the treatment group was breastfeeding mothers given oxytocin massage and date palm extract simultaneously. Each group consisted of 20 samples. The measurement of breast milk volume was conducted on day 7th and day 14th of postpartum.*

Results: *The results showed that there was no significant difference on the 7th day of measurement in all groups, while on the 14th day of measurement there was a significant difference in breast milk production in the group of mothers who were given date palm extract and oxytocin massage simultaneously, with a p-value of 0.000.*

Conclusion: *Date palm extract and oxytocin massage were very effective when given simultaneously to breastfeeding mothers in increasing milk production, so it was a good solution for breastfeeding mothers.*

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INTRODUCTION

Exclusive mother's breast milk (ASI) is the first food, the main and the best food for babies. It is a natural food and cannot be replaced by any food or drink. Breast milk contains various nutrients needed in the process of growth and development of infants. The benefits of breastfeeding are so great that it can reduce the risk of babies suffering from various diseases causing death, such as cancer, heart disease, hypertension, diabetes in adulthood, malnutrition, and will increase the incidence of obesity in children (Noviyana et al., 2022) (Scherbaum & Leila, 2016) (Wang et al., 2017) (Witkowska-zimny & El-Hasan, 2017).

The World Health Organization (WHO) states that in the Child Growth Standards applied throughout the world, it is emphasized that breastfeeding infants from birth to the age of 6 (six) months is very important. Furthermore, babies can be given complementary foods (*MPASI*) while still being breastfed until they reach 2 years old (Nabunya et al., 2020) (Triansyah et al., 2021) (Umbarsari, 2017). Exclusive breastfeeding is one of the most effective, practical, and inexpensive ways to prevent infant and child mortality (Taha et al., 2020) (World Health Organization, 2020).

Optimal breastfeeding is very beneficial because it can save more than 800,000 children under five every year. Children who have been exclusively breastfed are 14 times more likely to live than those who have not. According to the Data and Information Center of the Indonesian Ministry of Health in 2017, exclusive breastfeeding in Indonesia is only 35%.

This figure is still far below the WHO recommendation of 50%. The coverage of exclusive breastfeeding for the city of Palembang in 2017 was 72.76%. This coverage is still below the target of achieving Indonesia's exclusive breastfeeding, which is 80%. Various factors can cause this coverage not to be achieved, one of which is insufficient milk production (Aprilina et al., 2022) (Palembang, D. kota, 2020).

Lack of milk production is one of the reasons breastfeeding mothers decide to give their babies formula milk. Lack of confidence and excessive worry can cause inhibition of the production of the hormone oxytocin, which will eventually affect the production of breast milk, while the production of the hormone prolactin will be influenced by the food intake consumed by the mother (Noviyana et al., 2022) (L. P. Sari et al., 2017). In accordance with Government Regulation Number 33 of 2012 concerning Exclusive Breastfeeding, breast milk is a liquid produced by the secretions of the mother's breast glands. Exclusive breastfeeding is breast milk that is given to babies from birth for six months without adding and/or replacing it with other foods or drinks.

Breast milk is produced by the synergistic result of the mechanical stimulation of hormonal factors and the nervous system. Breastfeeding will have a positive impact on a baby's health because breast milk is the best and most important natural food for babies (Krol & Grossmann, 2018). The content and composition of substances in breast milk are in accordance with growth and development. Breastfeeding babies has been scientifically proven to increase children's intelligence. This is because one of the ingredients contained in breast milk and the most useful for increasing intelligence is DHA, one of the efforts to save costs (Hajian et al., 2020) (Sakti, 2018).

Many problems can occur during breastfeeding, for example in the first weeks of the postpartum period, one of which is the lack of milk production. The problem of insufficient milk production is one of the factors causing the failure of exclusive breastfeeding. Around 35% of breastfeeding mothers stop the breastfeeding process because they feel that the milk produced is still insufficient and not smooth, so they feel unable to meet the nutritional needs of their babies (Kuswaningrum et al., 2017) (Vitriani et al., 2021).

Various efforts have been made to increase breast milk production, one of which is through various massages or massage techniques, for example, by doing oxytocin massage. Oxytocin massage aims to stimulate the oxytocin reflex, or let down reflex. Oxytocin massage is conducted by massaging the back area along both sides of the spine, so it is hoped that by doing this massage, the mother will feel relaxed and stimulate milk production. A study on the relationship between oxytocin massage and

smooth milk production in postpartum mothers proved that 54.2% of respondents had smooth milk production (Depkes RI, 2018) (Nuampa & Payakkaraung, 2020).

Other efforts made by the community to increase breast milk production vary, one of which is by consuming drugs and foodstuffs that have a *galactagogue effect*. The most commonly used pharmaceutical drugs are domperidone and metoclopramide, but they have dangerous side effects such as arrhythmia, cardiac arrest, anxiety, depression, and sedation, so they are not very popular. In general, people prefer herbal supplements, which can usually be easily obtained around their homes.

The plant, which is traditionally believed to be able to reproduce and facilitate the release of breast milk, does not cause side effects and is cheap. A galactagogue is a substance that can help stimulate and increase the quality or quantity of breast milk. The mechanism of *galactagogue power* is a compound that can occur through direct stimulation of the protoplasmic activity of the secretory cells in the mammary glands so that milk secretion increases or stimulates the hormone prolactin to act on the alveolar epithelial cells (Karapati et al., 2022) (Rizqi et al., 2022).

Public knowledge about the use of food ingredients that have a galactagogue effect is an experience passed down from generation to generation by ancestors. One of them is the date palm, which is believed by the community to be a food additive that can increase the production of ASI. Dates are the fruit of the *Phoenix dactylifera plant*, which has one seed. Dates contain lots of carbohydrates, fats, proteins, various minerals, and vitamins, have fairly high fiber content, and have a galactagogue effect. Dates in exchange food ingredients are included in the fifth group, namely the fruit group, in which one exchange unit contains 50 calories, 10 grams of protein, and 10 grams of carbohydrates.

One unit of data exchange is equivalent to three dry dates weighing 100 grams. Today's society wants an instant culture or one that is practical and not burdensome. Making date palm juice preparations is one way to make it easier for mothers to consume dates (Hidana, 2018) (Karapati et al., 2022). Several previous studies have proven the effects of date palm juice and oxytocin massage on breast milk production separately. No one has investigated how effective it is if given simultaneously on breast milk production and since then, there has been a significant increase in breast milk production seen during the puerperium.

MATERIALS AND METHODS

The sample in this study were all breastfeeding mothers who came to visit the Midwife Independent Practice in the city of Palembang in 2021 who had met the inclusion criteria and exclusion criteria and were willing to be included after receiving an explanation. Sampling in this study was carried out with the *purposive sampling technique* to determine whether the sample included in the treatment group or control group was done by lottery (lottery). This type of research is comparative analytic with 1 measurement using an experimental research design (*posttest only design*).

The sample size in this study was calculated using the comparative sample size formula for categorical paired measurements. The sample used was 40 people, consisting of the treatment group who were given date palm extract and oxytocin massage, the control group was respondents who only received oxytocin massage, and previously *informed consent was given* before the examination. Inclusion criteria: respondent's age is 20–40 years, exclusive breastfeeding, normal parturition, baby's weight of 2500 g. Exclusion criteria: consuming breast milk supplements, using

hormonal contraceptives, smoking/drinking alcohol, anatomical breast abnormalities, sick or hospitalized babies, and not complying with SOPs.

Respondents who had met the inclusion criteria and had given *informed consent* were then interviewed using a questionnaire guide. On days 1–14 of group I, the treatment was given 1 tablespoon of date juice twice a day, and oxytocin massage was also performed twice a day in the morning and evening. The control group was only given oxytocin massage twice a day in the morning and evening.

Group II (control) was only given oxytocin massage twice a day in the morning and evening. To control nutrition and intake, all groups used the daily menu guidelines for breastfeeding mothers found in the MCH handbook. In the first measurement, namely on the 7th day (transitional breastfeeding) postpartum, and the second measurement on the 14th day postpartum (mature breastfeeding), each respondent measured the volume of breast milk using a breast pump before feeding the baby.

Both breasts were pumped with a manual pump for \pm 30 minutes or until both breasts felt empty. The volume of breast milk was measured using a measuring cup in mL. To distinguish milk production between the treatment group and the control group, a categorical comparative formula for 2 unpaired groups was used, namely the *Mann-Whitney test* because the data was not normally distributed.

This research has obtained *ethical clearance* from the Health Research Ethics Committee of the Health Polytechnic of the Health Ministry of Palembang No: 1174/KEPK/Adm2/IX/2021.

RESULTS

This research was conducted in 2021 at the Independent Practice of Midwives in the city of Palembang. All research subjects who came to visit PMB during the study were taken as samples and had to meet the inclusion and exclusion criteria. The complete research results are presented in the following tables:

Table 1. Characteristics of Respondents in the Two Research Groups

| Characteristics of Respondents | Group | | Value |
|--------------------------------|--|-------------------------------|-------|
| | Experiment (Date extract + Oxytocin massage) | Control (Oxytocin massage) | |
| Age Category | | | |
| < 35 years old | 19(95%) | 15(75%) | 0.077 |
| \geq 35 years old | 1(5%) | 5(25%) | |
| Work | | | |
| Working | 2(10%) | 2(10%) | 0.1 |
| Not working | 18(90%) | 18(90%) | |
| Education | | | |
| High | 13(65%) | 18(90%) | 0.127 |
| Low | 7(35%) | 2(10%) | |
| Parity | | | |
| Primipara | 9 (45%) | 7(35%) | 0.519 |
| Multipara | 11(55%) | 13(65%) | |

Description: *Chi Square Test

Based on table 1, the characteristics of the respondents in the two research groups show that there is no significant difference between the experiment group and the control group in terms of age, occupation, education, and parity categories where the p-value is > 0.05 . It shows that the two groups are homogeneous, so they deserve to be compared.

Table 2. Differences in breast milk production between the experiment group and control group on the first measurement (day 7th) and second measurement (day-14th)

| Measurement | Group | | p-value | |
|----------------------------|---|----------------------------------|----------|-------|
| | Experiment (Date extract + Oxytocin massage) | Control Oxytocin massage) | | |
| I (Day 7 th) | Mean (SD) | 95.75 | 88.75 | 0.312 |
| | Median | 97.50 | 90 | |
| | Range | 10 – 130 | 20 – 150 | |
| II (Day 14 th) | Mean (SD) | 193.75 | 133.25 | 0.000 |
| | Median | 210 | 120 | |
| | Range | 90 - 250 | 30 - 190 | |

Description: Mann Whitney test

Based on table 2, it can be seen that there is no significant difference in breast milk production between the experiment group and the control group in the first measurement where the p-value > 0.05 is 0.312, while in the second measurement there is a very significant difference between the experiment group and the control group where the p-value < 0.05 , which is 0.000. There is a significant difference in the average milk production at the time of the first measurement; the average milk production is 95.75 in the experiment group and 88.75 in the control group. In the second measurement for the experiment group, there is an increase of 193.75, and in the control group, there is an increase of 133.25. It means that date palm extract is very effective in increasing breast milk production, especially in the second week of postpartum.

Table 3. Distribution of Breast Milk Production by Age, Education, Working and Parity in the First Measurement (day 7th)

| Category | Breast milk production | | | | OR 95%CI | p-value |
|------------------|------------------------|------|--------------|------|---------------------|---------|
| | Good | | Insufficient | | | |
| | n | % | n | % | | |
| Age | | | | | | |
| ≤ 35 years old | 18 | 94.7 | 16 | 76.2 | 5.63 (0.6-53.4) | 0.105 |
| > 35 years old | 1 | 5.3 | 5 | 23.8 | | |
| Education | | | | | | |
| High | 13 | 68.4 | 18 | 85.7 | 0.36 (0.08-1.71) | 0.197 |
| Low | 6 | 31.6 | 3 | 14.3 | | |
| Work | | | | | | |
| Working | 1 | 5.3 | 3 | 14.3 | 0.33 (0.03-3.52) | 0.348 |
| Not working | 18 | 94.7 | 18 | 85.7 | | |
| Parity | | | | | | |
| Primipara | 11 | 57.9 | 13 | 61.9 | 1.18 (0.24-3.01) | 0.846 |
| Multipara | 8 | 42.1 | 8 | 38.1 | | |

Based on table 3 above, the first measurement shows that breastfeeding mothers in the age group of 35 years old with good milk production have an average of 18 (94.7%), while the age group > 35 years old with good milk production has an average of 1 (5.3%). There is no significant difference in breast milk production between mothers at age 35 and mothers in the age group of > 35 years old, with a p-value of 0.105, so there is no effect between age and milk production. The results of further analysis obtained OR = 5.63, which means that breastfeeding mothers who are 35 years old have a 5.63 times higher chance of having good breast milk production than mothers in the age category of > 35 years old.

On the characteristics of education, breastfeeding mothers who are highly educated have a good amount of breast milk production: 13 (68.4 %) compared to 6 (31.6 %). Those with a higher education are 0.36 times more likely to have good milk production compared to those with a low education. The first measurement of work characteristics shows that the majority of mothers with good breast milk production are not working mothers. There are a total of 18 people (94.7%), while working mothers are one person (5.3%).

There is no difference between the milk production of working mothers and non-working mothers. p-value = 0.199, OR = 0.33, which means that non-working breastfeeding mothers have a 0.33 times higher chance of having good breast milk production than the group of working mothers. Based on maternal parity in the first measurement, it shows that there are 11(57.9 %) multiparas with good breast milk production, while there are as many as 8 (42.1%).

There is no difference between primipara and multipara milk production with a p-value of 0.799. OR value = 0.85, which means that multipara breastfeeding mothers are 0.85 times more likely to have good breast milk production than the primipara group.

Table 4. Distribution of Breast Milk Production by Age, Education, Working and Parity on the Second Measurement (14th day)

| Category | Breast milk production | | | | OR 95%CI | p-value |
|------------------|------------------------|------|--------------|------|--------------|---------|
| | Good | | Insufficient | | | |
| | n | % | n | % | | |
| Age | | | | | | |
| ≤ 35 years old | 22 | 84.6 | 12 | 85.7 | 0.92 | 0.93 |
| > 35 years old | 4 | 15.4 | 2 | 14.3 | (0.15-5.76) | |
| Education | | | | | | |
| High | 21 | 80.8 | 10 | 71.4 | 1.68 | 0.51 |
| Low | 5 | 19.2 | 4 | 28.6 | (0.37-7.64) | |
| Work | | | | | | |
| Working | 2 | 7.7 | 2 | 14.3 | 0.5 | 0.51 |
| Not working | 24 | 92.3 | 12 | 85.7 | (0.06-3.1) | |
| Parity | | | | | | |
| Multipara | 18 | 69.2 | 6 | 42.9 | 3 | 0.109 |
| Primipara | 8 | 30.8 | 8 | 57.1 | (0.78-11.53) | |

Description: Chi-Square, Mann Whitney

Based on table 4 above, the second measurement shows that breastfeeding mothers in the age group of ≤ 35 years old with good milk production are 22 people (84, 6%), while the age group > 35 years old with good milk production is 4 people (15, 4 %). There is no significant difference in breast milk production between mothers in the

age group of ≤ 35 years old and mothers in the age group of > 35 years old, with a p-value = 0,93, so there is no effect between age and breast milk production, OR value = 0,92. It means that breastfeeding mothers who are aged ≤ 35 years have a 0.92 higher chance of having good breast milk production than mothers in the age group of > 35 years old.

On the characteristics of education in the second measurement, the high education group has 13 people (68.4) with good breast milk production, compared to only 6 people with low education (31.6%). There is no difference in milk production between high-educated and low-educated mothers with a p-value of 0.51 OR = 1.68. It means that a breastfeeding mother with a higher education is 1.68 times more likely to have good breast milk production than the low-education group.

Based on the second measurement of the working category, it shows that there are 24 non-working mothers (92,3%) with good breast milk production, while among working mothers with good breast milk production, there are only 2 (7.7%). There is no difference between breast milk production of working and non-working mothers with a p-value of 0.51, the value of OR = 0.5. It means that breastfeeding mothers who are not working have a 0.5-times higher chance of having good breast milk production than working mothers.

Based on maternal parity in the second measurement, it shows that there are 18 multipara mothers with good milk production (69.2%), while there are 8 primipara mothers with good breast milk production (30.8%). It shows that there is no difference between primiparas and multiparas with good breast milk production. p-value = 0.109, with OR = 3. It means that breastfeeding mothers with multipara are 3 times more likely to have good breast milk production than the primipara group.

DISCUSSION

The results of this study are in accordance with research conducted that suggests there is no significant correlation between age and breast milk production ($p = 0.513$), and it is also in line with research conducted that suggests age, parity, level of education, and work do not have a significant correlation to breast milk production. The ideal age range for reproduction, including breastfeeding, is 20–35 years. In this study, most of the respondents were in this age category, so the level of psychological maturity was good.

There was no difficulty in breastfeeding. When the level of psychological maturity is lower, it will affect the production of breast milk because the anxiety factor can affect the prolactin and oxytocin hormones, which play a very important role in breast milk production. In this study, in terms of maternal education, both in the first and second measurements, there was no difference in breast milk production between mothers with high education and mothers with low education. p-value > 0.05 in this study.

It is also in line with research conducted by (Neves et al., 2021), that education will be affected by one's knowledge. In this study, it was found that respondents aged 20–35 years old had good knowledge of 83.3%. The higher the age, the higher the grasping power and mindset will develop, so that the knowledge obtained will also improve and increase.

The increase in a person's age will change the physical and psychological aspects (mental). Growth in humans occurs due to the maturation of organ functions. In the

psychological or mental aspect, a person's level of thinking is getting more mature and wise.

The higher the level of knowledge of breastfeeding mothers. The higher the knowledge and awareness of breastfeeding mothers to try to increase their breast milk production (Neves et al., 2021) (Prince et al., 2020), both having food and breast care treatment. On the characteristics of work in the first and second measurements, it was found that there was no significant relationship between work and breast milk production where a p-value > 0.05 was not found.

This research is in line with what was done by Tsai (2022), who claimed that the type of mother's work is not related to breast milk production. Because when they have different workloads or all types of work produce the same effect on the mother's physical and psychological condition, even though all types of work have their own difficulties and demands. In this study, 62% of working mothers had breast milk production < 100 ml/day, but there was a very significant correlation between the duration of work and breast milk production with a p-value of 0.001.

Based on the results of this study, it can be seen from the parity of mothers in the first and second measurements that there is no significant difference between the milk production of primiparas and multiparas mothers where the p-value was >0.05 . According to several studies that have been conducted previously, there are many factors that can affect parity. Including education, economic status, culture, and a person's occupation.

Primiparas will usually be more enthusiastic in welcoming the birth of their first child, and it is also a first-time experience in giving birth because it allows primiparas to find out about exclusive breastfeeding. While women who have given birth more than once certainly have experience in breastfeeding so that lactation management will be carried out properly (Nugraha & Andini, 2022). In this study, it was found that there was a significant difference in breast milk production between the treatment group and the control group in the first measurement where the p-value > 0.05 was 0.312, while in the second measurement there was a very significant difference between the treatment group and the control group where the p-value <0.05 was equal to 0,000.

Many factors can cause failure in the process of exclusive breastfeeding, some of them come from internal and external factors. Internal factors include physical and psychological conditions, mother's knowledge, and physical factors of the baby, while external factors include early initiation of breastfeeding (IMD), stress and breastfeeding frequency, including insufficient milk production, difficulty in sucking baby, unsupportive condition of the mother's nipples/nipple anatomy, working mothers, nutrition. The desire to be called modern, the influence of advertising and promotion of breast milk supplements, and the assumption that all breastfeeding mothers have good knowledge about the benefits of breastfeeding (Jalal et al., 2017) (L. P. Sari et al., 2017).

Breast milk production is a process of forming breast milk from the cooperation of the hormones prolactin and oxytocin. The hormone prolactin during pregnancy increases even though breast milk has not come out because it is still inhibited by the high level of the estrogen hormone. When giving birth, the hormones estrogen and progesterone will decrease, and the hormone prolactin will become more dominant so that milk secretion occurs.

Breast milk production is influenced by the prolactin hormone, while the secretion of breast milk is influenced by the hormone oxytocin. The oxytocin hormone will come

out through stimulation of the nipples through the baby's mouth sucking or through massage on the mother's spine, such as oxytocin massage (Alex et al., 2020) (Noviyana et al., 2022). Breast milk production is influenced by the hormones prolactin and oxytocin. Some efforts to stimulate prolactin and oxytocin hormones after giving birth, apart from expressing breast milk, can also be done in various ways, such as breast care, early initiation of breastfeeding (IMD), breastfeeding on demand, oxytocin massage, consuming food or supplements to stimulate increasing breast milk production. (L. P. Sari et al., 2017) (Triansyah et al., 2021).

Massage or stimulation of the spine, the *neurotransmitter* will stimulate the *modula oblongata*, which then sends a message to the *hypothalamus* in the *posterior pituitary* to release oxytocin, causing the breasts to secrete milk. Massage in the area along the spine will increase the release of the hormone oxytocin, which will cause a relaxing effect and will relieve stress (Hallowell et al., 2017), which will help improve milk (Katmini & Sholichah, 2020) (N. Sari et al., 2017). In this study, milk production was seen to increase in the second measurement, on day 14th ρ -value <0.05 with an average volume of breast milk in the treatment group of 193.75 and the control group was 133.25. It showed that date palm extract was very effective in increasing breast milk production, especially in the second week postpartum.

This study is also in line with research conducted by Prianti et al., (2020), who found that most respondents have good milk production after being given date palm extract with 86.7%, where p -value = 0.023. It proves that there is an effect of giving date palm extract on breast milk production. Breastfeeding mothers who have insufficient milk production, mothers who want to breastfeed their babies again, or mothers who have just adopted a child and want to breastfeed their babies again (relactation) are recommended to take additional supplements and herbal foods containing galactagogues so that they can stimulate the increase in breast milk production.

A type of herbal supplement that was used to increase breast milk production a long time ago. Commonly used herbal supplements are Shatavari, milk thistle, fenugreek, fennel, cumin, and anise (Khorshidian et al., 2019). According to the Sanford Health health journal, date fruits are one of the herbal foods that contain galactagogues, which can increase prolactin, a hormone involved in the production of breast milk.

This fruit contains many important micronutrients, such as potassium, magnesium, phosphorus, zinc, manganese, and selenium, which are believed to be important minerals in immune function and cancer prevention, as well as macronutrients such as carbohydrates, proteins, fats, and almost 90 % composed of water. (Prianti et al., 2020).

CONCLUSION

Based on the results of the data analysis, it can be concluded that there is a significant difference in breast milk production between mothers who were given a combination of date palm juice and oxytocin massage on the second measurement, suggesting that date palm extract and oxytocin massage were very effective given simultaneously in the second week of postpartum and breastfeeding in increasing breast milk production.

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Original Research

The Effect Of Family Support On The Recovery Of Postpartum Mothers Based On Matrilineal Culture In Disaster Risk Areas

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ABSTRACT

Backgrounds: *The incidence of maternal death during pregnancy and the puerperium is high and has not been resolved. Many factors affect the recovery of postpartum mothers, among which the main factor is family support. The purpose of this study was to examine the effect of family support on the recovery of postpartum mothers based on the matrilineal culture in disaster-affected high-risk areas.*

Methods: *This type of research is quantitative with a cross-sectional study design. This research was conducted in the independent practice of midwives in Padang City and Pesisir Selatan Regency. The population of this study was postpartum mothers whose samples were taken by consecutive sampling, totaling 140 people. Univariate analysis was conducted in the form of frequency distribution and mean, while bivariate analysis used the Chi-square test.*

Results: *The results of the study found that 61.4% received good support from their husbands, 63.6% received good support from their parents, 73.6% had normal physical recovery and 2.4% had risky physical recovery. There is an influence of the husband's support and family support on the recovery of postpartum mothers both physically and psychologically (p-value = 0,000).*

Conclusion: *The support of the husband and parents has a positive effect on the recovery of postpartum mothers, both physically and psychologically. There is a need for counseling and providing knowledge to families about the importance of family support in the recovery process during the postpartum period.*

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INTRODUCTION

One indicator of the success of maternal health efforts is the maternal mortality rate caused by pregnancy, childbirth, and the postpartum period. In general, maternal mortality has decreased from 390 to 305 per 100,000 live births. This reduction in maternal mortality has not succeeded in achieving the MDG target of 102 per 100,000

live births in 2015. Efforts to accelerate the decline in MMR can be carried out by ensuring that every mother is able to access quality maternal health services, such as health services. Pregnancy care for pregnant women, delivery assistance by trained health personnel in health care facilities, and postnatal care for mothers and babies (Kementerian Kesehatan Republik Indonesia, 2019).

The postpartum period is an important thing to pay attention to in order to reduce maternal and infant mortality in Indonesia. With various experiences in dealing with maternal and infant mortality in many countries, postpartum services are health services that meet standards for mothers from 6 hours to 42 days after delivery by health workers. Postpartum care is important for mothers and babies because it is a time of crisis for both mother and baby.

60% of maternal deaths occur after delivery, and 50% of deaths during the puerperium occur within the first 24 hours. Likewise, the neonate period is also a critical period of the baby's life. Two-thirds of infant deaths occur 4 weeks after delivery, and 60% of newborn deaths occur 7 days after birth (Susilo Rini dan Feti Kumala D, 2017).

Maternal health services during the postpartum period are at least 3 times to ensure that the postpartum mother is in good health and does not experience complications. Complications that often occur during the puerperium are bleeding in the birth canal, swelling in the face, hands, or feet, seizures, fever, swollen and red breasts, and pain. Complications that occur in postpartum mothers can have an impact on breastfeeding, so it is closely related to the health of the baby (Dinas Kesehatan Kota Padang, 2019).

Many factors can affect this process, such as energy level, comfort level, the health of the newborn, health workers, and the care provided, as well as the husband and family around the postpartum mother. The anatomical and physiological changes that occur during the puerperium include changes in the reproductive organs, digestive system, urinary system, musculoskeletal system, endocrine system, and so on. The main factor is husband and family support, which really supports changes in the postpartum period so that it takes place normally (Susilo Rini dan Feti Kumala D, 2017).

There are three factors related to postpartum stress, including the achievement of roles during childbirth, lack of social support, and changes in the body after giving birth. There is evidence showing that providing support to postpartum mothers can improve the parenting, mental health, quality of life, or physical health of mothers and mothers who are at high risk in need of postpartum support (Pratami, 2016). In addition to factors of physical and psychological change, environmental factors also greatly affect recovery during the postpartum period.

Mothers who live in mountainous and coastal environments will have different needs, especially if they live in disaster-risk areas. There is a need for individual and family preparedness in dealing with disasters. In increasing family preparedness against disaster risk, it is necessary to socialize disaster response so that families and communities have good knowledge of and attitudes toward disaster self-rescue efforts, emergency planning, and warning systems. This will minimize the impact of the disaster on families, including vulnerable groups such as pregnant women, maternity, postpartum/breastfeeding, children, and the elderly (Nugroho, 2007).

The above factors are also influenced by the prevailing culture in each region. In Minangkabau, which adheres to a matrilineal system, women are placed in an important

position in the family. Women are positioned as the successors of the lineage as well as guarantors of the existence and continuity of a Minangkabau family.

This should be beneficial for mothers who are in the postpartum period because they get full support from their husbands and families. However, on the other hand, in practice, the position of women in Minangkabau remains under the control of men, namely mamak (mother's brother), both in the family and social circles. Unfortunately, this is not fully applicable to families in Minangkabau (Putri, 2015).

In addition, the matrilineal kinship system places the positions of women and men in a balanced way. Men are placed as protectors and supervisors, who are presented with a respectable position (prestige) as Mamak, while women have access to property (property). Meanwhile, men and women should have equal access to making decisions. Problems occur when the implementation does not run as the cultural values are agreed upon again (Fatimah, 2012).

The provisions of nature according to their nature are the basis for the formation of a matrilineal social system in Minangkabau. Mothers who conceive, give birth, breastfeed, teach speech, and educate a child naturally. Meanwhile, fathers have little time and opportunity to spend time with their children and pay attention to their needs. A father must earn a living to meet the needs of his wife and children so that more are outside the home.

Consequently, it is not uncommon for children to be closer and feel more comfortable when they are with their mothers. Natural conditions like this are used as a basis for determining a social system in Minangkabau (Ariani, 2016). This study aims to identify family support for postpartum maternal recovery and disaster response situations and determine the effect of husband and parental support on postpartum maternal recovery.

MATERIALS AND METHODS

This research is an observational analytic study with a cross-sectional design. This research was carried out in disaster-risk areas located on the coast, namely Padang City and Pesisir Selatan Regency, from March to December 2021. The population in this study was postpartum mothers from 1 to 42 days in the independent practice of midwives in Padang City and Pesisir Selatan Regency, totaling 140 people taken by consecutive sampling technique.

The inclusion criteria for the sample in this study were postpartum mothers and normal babies, not single parents and having parents or in-laws near where they lived. The type of data in this study was primary, which means it was obtained directly from the research subjects through observation and interviews on family support and postpartum recovery. Data were gathered through interviews, questionnaire completion, and observation of postpartum recovery. Bivariate analysis was performed using the Chi Square test.

This research has passed the ethical test at Andalas University Padang with a certificate of passing the ethical review No. 388/UN.16.2/KEP-FK/2021.

RESULTS

The results of the univariate analysis of 140 postpartum mothers can be seen in the table below:

Table 1. Frequency Distribution of Respondents Characteristics

| Variable | Frequency | Percentage (%) |
|-----------------|-----------|----------------|
| Age | | |
| <20 years | 3 | 2,1 |
| 20-35 years old | 124 | 88,6 |
| >35 years old | 13 | 9,3 |
| Parity | | |
| Primipara | 45 | 32,1 |
| Multipara | 95 | 67,9 |

Table 1 shows 124 people (88,6%) whose age range is 20-35 years, which is at a healthy reproductive age and 95 people (67,9%) have more than 1 child (multipara).

Table 2. Distribution of Disaster Response Frequency

| Variable | Frequency | Percentage (%) |
|---|-----------|----------------|
| Have you ever received socialization about self-rescue during a disaster | 91 | 65 |
| Knowing evacuation directions and safe locations | 112 | 80 |
| Have you ever talked about how to save to an evacuation site with your family | 88 | 63 |

Table 2 shows that, based on the results of a questionnaire on disaster response to postpartum mothers and their families, 91 people (65%) had received socialization about self-rescue during a disaster, 112 people (80%) knew evacuation directions and safe locations, and 88 people (63%) have talked about how to save to an evacuation site with their families.

Table 3. Relationship between Husband's Support and Physical Recovery of Postpartum Mothers

| Husband Support | Physical Recovery | | | % | Amount | p value |
|-----------------|-------------------|------|------|------|--------|---------|
| | Normal | % | Risk | | | |
| Well | 78 | 90,7 | 8 | 9,3 | 86 | 0,000 |
| Not enough | 25 | 46,3 | 29 | 53,7 | 54 | |
| Amount | 103 | 73,6 | 37 | 26,4 | 140 | |

Table 3 shows that out of 86 postpartum mothers who received good husband support, only 8 people (9.3%) had physical recovery at risk, while of 54 postpartum women who received less husband support, as many as 29 people (53.7%) had physical recovery at risk. The results of the bivariate analysis with the Chi-Square test indicate that there is a significant relationship between the husband's support and the postpartum mother's physical recovery with a p-value of 0,000 (<0,05).

Table 4. Relationship between Husband's Support and Psychological Recovery of Postpartum Mothers

| Husband Support | Psychological Recovery | | | % | Amount | p value |
|-----------------|------------------------|------|------------|-----|--------|---------|
| | No Depression | % | Depression | | | |
| Well | 78 | 90,7 | 8 | 9,3 | 86 | 0,060 |

| Husband Support | Psychological Recovery | | | % | Amount | p value |
|-----------------|------------------------|------|------------|------|--------|---------|
| | No Depression | % | Depression | | | |
| Not enough | 42 | 77,8 | 12 | 22,2 | 54 | |
| Amount | 120 | 85,7 | 20 | 14,3 | 140 | |

Table 4 shows that of the 86 postpartum mothers who received good husband support, only 8 (9.3%) experienced depression, while out of 54 postpartum mothers who received less husband support, 12 (22.2%) experienced depression. The results of the bivariate analysis with the Chi-Square test indicate that there is no significant relationship between the husband's support and postpartum maternal psychological recovery with a p-value of 0,060 ($> 0,05$).

Table 5. The Relationship of Parental Support with Postpartum Mother's Physical Recovery

| Parental Support | Physical Recovery | | | % | Amount | p value |
|------------------|-------------------|------|------|------|--------|---------|
| | Normal | % | Risk | | | |
| Well | 77 | 86,5 | 12 | 13,5 | 89 | |
| Not enough | 26 | 51 | 25 | 49 | 51 | 0,000 |
| Amount | 103 | 73,6 | 37 | 26,4 | 140 | |

Table 5 shows that of the 89 postpartum mothers who received good parental support, only 12 people (13,5%) had physical recovery at risk, while out of 51 postpartum mothers who received less parental support, as many as 25 people (49%) had physical recovery at risk. The results of bivariate analysis with Chi Square test, there is a significant relationship between parental support and postpartum maternal physical recovery with p value = 0,000 ($< 0,05$).

Table 6. Relationship between Parental Support and Psychological Recovery of Postpartum Mothers

| Parental Support | Psychological Recovery | | | % | Amount | p value |
|------------------|------------------------|------|------------|------|--------|---------|
| | No Depression | % | Depression | | | |
| Well | 84 | 94,3 | 5 | 5,7 | 89 | |
| Not enough | 41 | 80,4 | 10 | 19,6 | 51 | 0,026 |
| Amount | 125 | 85,7 | 15 | 14,3 | 140 | |

Table 6 shows that of the 89 postpartum mothers who received good parental support, 5 (5,7%) experienced depression, while of the 51 postpartum mothers who received less parental support, 10 (19,6%) experienced depression. The results of bivariate analysis with Chi Square test, there is a significant relationship between parental support and postpartum maternal psychological recovery with p value = 0,026 ($< 0,05$).

DISCUSSION

Tables 1 and 2 describe the characteristics of respondents based on age and parity as well as disaster response preparedness. Preparedness of individuals and families in the face of natural disasters is very important. The main indicators that can be used to measure the level of preparedness of individuals and families refer to indicators issued by LIPI, including knowledge and attitudes, emergency planning, warning system and resource mobilization. In improving the preparedness of families against disaster risk,

socialization is needed so that families and communities have good knowledge and attitudes towards disaster rescue efforts, emergency planning, warning systems, and resource mobilization.

In a disaster emergency situation, it is necessary to make quick and appropriate decisions to reduce risk. Each family member must make a mutual agreement to be better prepared in dealing with disasters. The plan must be conveyed to all family members and need to be simulated so that when a disaster situation occurs, they can protect and help each other. From the survey results of the earthquake in Japan in 1995, 34.9% of victims survived because they could save themselves and 31.9% because they were helped by their families. Therefore, it is necessary to master the rescue in disaster situations by oneself, family and community (BNPB, 2018).

Based on table 3, there is a significant relationship between husband's support and postpartum mother's physical recovery. These results are also supported by research on husband's support for breastfeeding mothers in Surabaya which concludes that practical and emotional husband support can ease the wife's burden in the family and appreciate and encourage her to be a wife's strength to succeed in breastfeeding. Husband's support is a form of attention and affection. Support can be provided both physically and psychologically.

The husband has a significant role in determining the health status of the mother. A good husband's support can provide good motivation for mothers to check their pregnancy (Wattimena et al., 2015). Husbands who provide full support to postpartum mothers are not at risk for depression. On the other hand, if postpartum mothers only get minimal support from their husbands, they will be at high risk of experiencing postpartum depression (Handini & Puspitasari, 2021).

Another study in Pekanbaru City showed the same result that husband's support was significantly related to the incidence of postpartum blues. Positive support from the husband is very necessary in helping the mother recover during the postpartum period because the husband is the closest person to the mother. Good cooperation between mother and husband will create an atmosphere that supports the postpartum mother's recovery period and assists the mother in caring for the baby. Mothers who experience postpartum blues will experience mild mental disorders so that it can have a negative impact on the development of mothers and children and can cause problems with their husbands (Fitrah & Siska Helina, 2017).

Riskesdas data in 2018 showed complete postpartum visits (KF) of 37,0%. The implementation of this postpartum visit really needs the support of the husband which is one of the important domains for postpartum mothers. Based on the results of research on postpartum mothers in Semarang City, there is a relationship between husband's support and the frequency of postpartum repeat visits. Postpartum visits are very important to assess the status of mothers and newborns as well as to prevent, detect and deal with problems that occur during the puerperium. The cause of death in postpartum mothers is also related to the presence of physical health problems such as anemia, bleeding, infection and pre-eclampsia (Hasanah, 2014).

Table 4 shows that there is no significant relationship between husband's support and postpartum mother's psychological recovery with p value = 0,026 (> 0,05). Another study in Sumenep Regency showed a significant relationship between family support and the incidence of postpartum blues with a p value of 0,000. These results are slightly different because the number of respondents for postpartum mothers is only 13 people, while in this study there were 140 respondents (Sri Yunita Suraida Salat et al.,

2021).

In addition, most studies look at overall family support, not just husband support. Family support is attitudes and actions of family acceptance of family members, in the form of informational support, assessment support, instrumental support and emotional support from husbands, siblings, brothers-in-law, parents, in-laws, grandparents and grandmothers. Through the form of caring support in the form of warmth, caring and expressions of empathy, there will be a belief that the individual is loved and cared for. Emotional attention will make the postpartum mother feel confident that she is not alone going through her postpartum period. Instrumental assistance in the form of materials and actions will make it easier for mothers to carry out various activities (Sulistyaningsih & Wijayanti, 2020).

Tables 5 and 6 show that there is a significant relationship between parental support and postpartum mother's physical and psychological recovery with p value = 0,000 and 0,026 (<0,05). During the postpartum period, mothers have various needs for health recovery, including the need for nutritious food, adequate rest, perineal wound care and proper breastfeeding. In order for this need to be fulfilled properly, the mother also needs the support of other family members such as the biological mother, mother-in-law and siblings. With all the problems and anxieties and fears experienced by postpartum mothers, it is necessary to have family support from husbands, parents, in-laws and other families so that mothers can pass their postpartum period well and normally (Sulistyaningsih & Wijayanti, 2020).

Qualitative research in New York showed that all groups of postpartum mothers stated that instrumental support was a very important support for physical and emotional recovery during the postpartum period. This instrumental support is assistance from the husband and family in meeting the basic needs of the mother and supporting the breastfeeding process. This lack of instrumental support is the cause of the emergence of postpartum depression symptoms. Husbands and parents, especially mothers, are the main sources who are expected to provide instrumental and emotional support (Negron et al., 2013).

Family support according to Friedman is an attitude, an act of family acceptance of his family members, in the form of informational support, appraisal support, instrumental support and emotional support. So family support is a form of interpersonal relationship that includes attitudes, actions and acceptance of family members, so that family members feel that someone is paying attention. A person will have a better and more stable personality if they are in a supportive social environment than those who do not get family support because family support is considered to be able to reduce or fortify the mental health impact of individuals from all the problems they face (Friedman, 2013).

CONCLUSION

Postpartum mothers really need support from various parties. Husbands and families, especially parents, play a role in adequate food/nutrition, which is the most needed by postpartum mothers. The type of support that is most needed is emotional support followed by instrumental needs and informational support.

The most priority support is emotional support followed by instrumental support. In a disaster situation, according to husbands and postpartum mothers, the most important support is attention followed by safety assistance. All sources of the preliminary study agreed that postpartum mothers need to get support that must be

given by the whole family and health workers, especially midwives.

There is an influence of husband's and parent's or family's support on postpartum maternal recovery, both physically and psychologically, although husband's support for psychological recovery is not statistically significant because it only assesses the husband, while a postpartum mother needs support from all family members.

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Original Research

Estimation Of Low Birth Weight Risk In Indonesia: What Is The Most Appropriate Intervention?

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ABSTRACT

Background: The prevalence of low birth weight (LBW) in the world (20%) and in Indonesia is still high (12.4%). The importance of efforts to reduce the incidence of LBW is written in the global nutrition targets for 2025.

Methods: The study design in this study was quantitative using the data set 'Indonesian Demographic and Health Survey (IDHS) of 2017. The samples included in the research process were 13,269 samples with probability proportional to size (PPS) sampling technique. The research instrument was based on a modified DHS VII questionnaire. Data were analyzed by chi-square test, binary logistic regression, and Receiver Operating Characteristics (ROC).

Results: The prevalence of LBW in Indonesia is 7% [95% CI: 6.6, 7.5]. The final model for determining low birth weight after controlling for confounding was gemelli $P < 0.001$ [OR: 22.428; 95% CI: 14.145, 35.561], history of pregnancy complications $P < 0.001$ [OR: 1.906; 95% CI: 1.569, 2.315], education level $P = 0.002$ [OR: 1.581; 95% CI: 1.180, 2.117], economic status $P < 0.001$ [OR: 1.509; 95% CI: 1.225, 1.859], and gestational interval $P = 0.016$ [OR: 1.401; 95% CI: 1.066, 1.842]. The minimum probability of the prediction model is 2.8%-80.5% [AUC = 0.638; Sensitivity = 0.074; Specificity = 0.996].

Conclusion: Diagnostic performance with ROC evaluation on a predictive model of LBW determinant has very high specificity power. Mothers with gemelli status need to be the focus to reduce the risk of low birth weight.

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INTRODUCTION

Low birth weight (LBW) is still a public health problem and is a major global concern (Getaneh et al., 2020). Almost all countries experience low birth weight (World Health Organization, 2014a). Based on data from the World Health Organization (WHO), the incidence of low birth weight has an estimated birth weight range of 15% to 25%, or more than 20 million babies in the world experience low birth weight events.

The prevalence of low birth weight in Indonesia is 12.4% (Kementerian Kesehatan RI, 2018). When considering cases that have not been reported, there is a possibility of a higher prevalence compared to the reported data (World Health Organization, 2019).

The importance of efforts to reduce the incidence of low birth weight is reflected in the 2025 global nutrition targets in policies for comprehensive implementation plans for mothers, infants, and children (World Health Organization, 2014a). One of these policies is to reduce the incidence of low birth weight by 30% in 2025 (World Health Organization, 2018). The purpose of the policy is to increase attention, investment, and intervention actions that are effective and efficient. Thus, further studies are needed to reduce the 14 million to 20 million cases of low birth weight (World Health Organization, 2014b).

Birth weight is also a significant predictor determining a person's health status in the future (Mahumud et al., 2017). The quality of life of a nation will be indirectly determined by the quality of life of a baby. Babies who do not meet the normal estimation criteria are a vulnerable group that affects their health status (Farida, 2018). So, birth weight becomes an important indicator of infant health, both in terms of physical and cognitive development (Kusumawati, 2017). Babies with low birth weight status will be physically more susceptible to metabolic disorders in the future (Saragih & Yovsyah, 2017).

The determinants of the incidence of low birth weight in Indonesia are still being studied. Furthermore, research that estimates prediction models in Indonesia has not yet been formulated, and world research still has low sensitivity and specificity, so it is still unclear which risk factors are most appropriate to control. Several studies say the incidence of low birth weight is caused by multiple factors (Hasriyani et al., 2018) (Kusumawati, 2017) (Mahumud et al., 2017) (Rahfiludin & Dharmawan, 2018) (Siramaneerat et al., 2018) (Sunarseh & Wahtini, 2018).

Diagnostic performance on determinants of low birth weight in India has a high sensitivity but moderate specificity (sensitivity = 80.6%; specificity = 70.4%) (Metgud et al., 2013). In Malaysia also has a high sensitivity value but a moderate specificity based on maternal factors (sensitivity = 80%; specificity = 75%) (Yadav & Lee, 2013). Formulation of diagnostic performance on determinants of low birth weight is important to identify dominant risk factors and predict the accuracy of low birth weight.

Therefore, it is necessary to conduct research on the determinants of the incidence of low birth weight in Indonesia with the diagnostic performance of predictive models to determine the most appropriate intervention. The purpose of this study was to determine diagnostic performance by evaluating ROC on an LBW prediction model to determine the most appropriate intervention strategy in Indonesia.

MATERIALS AND METHOD

This study uses the latest data from the Indonesian Demographic and Health Survey (IDHS) of 2017. This type of research is an observational analytic study using a cross-sectional study design. The use of the design in this study aims to determine the prevalence of low birth weight (LBW) in a population, and then the exposure and effects are studied at the same time.

The research locations covered in the IDHS were 34 provinces, or all provinces in Indonesia. Data utilization and further analysis by researchers were carried out in Medan City, North Sumatra Province, Indonesia. The research carried out by the researchers began in February 2020 and ended in August 2022.

The population in this study were women of childbearing age (WUS) aged 15 to 49 years who had children aged 0–59 months in all provinces in Indonesia. The sample in the IDHS consists of 1,970 census blocks in urban and rural areas with a household sample size of 49,250 households. In all the household samples, 59,100 female respondents of childbearing age aged 15 to 49 years were obtained.

The sample in this study were women of childbearing age who had been selected and met the inclusion and exclusion criteria of the study. Based on the results of data cleaning that has been done, there are 13269 samples included in the study. The following is the flow of sampling carried out by the researcher (Figure 1).

The sampling technique used is determined by two stratified levels, the first stage is a systematic probability proportional to size (PPS) sampling technique based on the number of census blocks contained in each regency/city. Size refers to the number of households based on the 2010 Population Census (SP) listing results that are not included in special households (barracks, orphanages, prisons, and boarding houses with >10 people). Then the implicit stratification process is carried out by sorting the census blocks based on the category of rural, urban, and welfare index from the results of the complete enumeration of the 2010 Population Census

In the second stage, 25 ordinary households are selected (the sample size is calculated by considering the relative standard error (RSE) systematically in each census block based on the updated household output. Women of childbearing age in households that were selected as research samples and met the requirements were interviewed with a list of women of childbearing age in the age range of 15 years to 49 years. The inclusion criteria in this study are women of childbearing age with an age range of 15 years to 49 years, having children aged 0 months to 59 months living with their mothers in the selected sample, and having the baby weighed at birth. The exclusion criteria in this study are respondents who answered "don't know" during the interview and incomplete data on research variables.

The data collection was carried out on the Indonesian Demographic and Health Survey (IDHS) data collected through interviews using a research instrument in the form of a questionnaire based on the modification of the Demographic Health Surveys phase 7 (DHS VII) questionnaire and the signing of informed consent by respondents during interviews by field officers. The researcher obtained the data set by downloading it from a registered account.

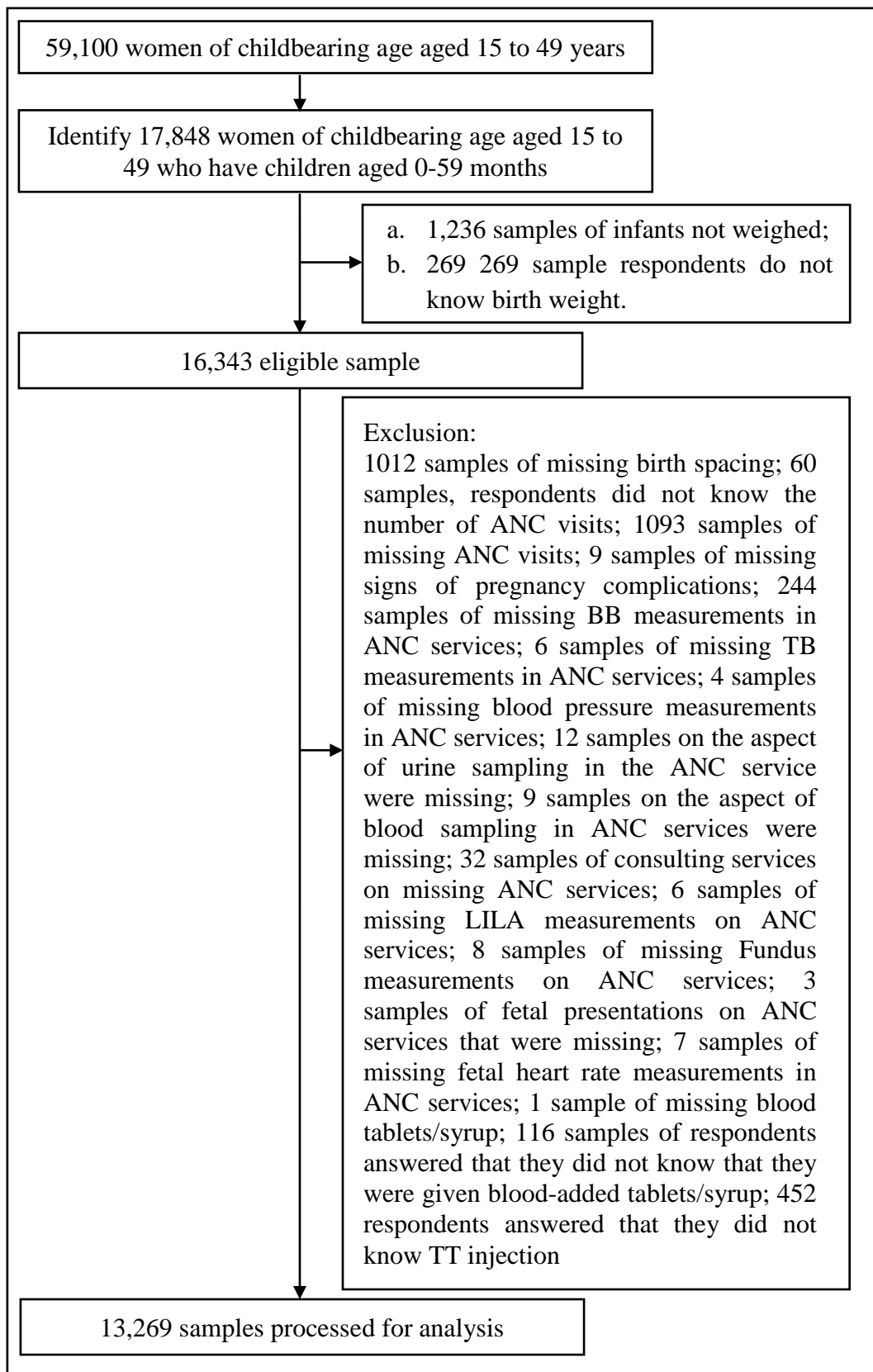


Figure 1. Sampling Flow

In this study, the univariate analysis aims to see the central distribution as well as the distribution for numerical variables and frequency distributions on categorical scale variables. Bivariate analysis using the chi-square test to determine the relationship between variables is then used for the selection or selection of candidates as predictive variables. The variable has a significant relationship if $p < 0.05$.

In the multivariate analysis using the binary logistic regression test, the analysis of the diagnostic performance of the prediction model was carried out by analyzing the Receiver Operating Characteristics (ROC) on the predicted output probabilities with the output sensitivity and specificity of the prediction model. In addition, analysis of the Area Under the ROC Curve (AUC) value is used to determine the level of accuracy of the predicted probabilities interpretation of the level of strength, namely: 50%-60% (very weak), 61%-70% (weak), 71%-80% (moderate), 81%-90% (strong), and 91%-100% (very strong).

In the dominant factor, there are terms of sensitivity and specificity as the outcome of diagnostic performance as a predictor for the occurrence of a topic under study. Sensitivity is the percentage of true positive cases whose observations are correctly predicted by the model. Specificity is the percentage of observations that are also correctly predicted and do not have true negative results from the model. The sensitivity and specificity estimates are obtained by defining the dependent variable (Y) to be a dichotomous result, $Y = 1$ if a disease occurs, and $Y = 0$ otherwise.

The presence or absence of a disease is defined as the "gold standard," and comparing it with a binary explanatory variable (X1), as long as the variables used are Predicted Probability is the probability of prediction for the occurrence of a point of interest (category 1) in subjects with certain characteristics. Epidemiological research usually estimates the risk of an outcome in a group of people compared to a reference group. The calculated effect measurement of the predicted probability is in line with the generalization of the standardization technique.

RESULTS

The prevalence of low birth weight in Indonesia is 7%, in the actual range of 6.6% to 7.5% (Table 1). The majority of mothers still have an optimal number of children, safe birth spacing, a good quantity of antenatal care (ANC), do not have multiple births, and have no history of pregnancy complications. However, the mother's education level is still low, her economic status is low, and the quality of antenatal care services is poor.

The average maternal age, parity, gestational interval, and quantity of antenatal care services are in the optimal category. Nevertheless, these variables are in the aspect of the lowest value, and the highest value is in the very risky category. Among all the risks, only abortion history and quality of ANC services were not associated with LBW.

The diagnostic performance of the prediction model is adequate in categories with the best specificity, where Gemelli, history of pregnancy complications, education level, economic status, and distance from pregnancy are risk factors that must be controlled.

Table 1. This is a table. Tables should be placed in the main text near the first time they are cited
Characteristics of LBW Risk Factors in Indonesia

| Characteristic | Frequency | Percentage | 95% CI |
|---------------------|-----------|------------|-----------|
| Variable | | | |
| LBW | 934 | 7.0 | 6.6-7.5 |
| Normal | 12335 | 93.0 | 92.5-93.4 |
| Mother's Age | | | |

| Characteristic | Frequency | Percentage | 95% CI |
|---|-----------|------------|-----------|
| At risk (<20 and >35 Years) | 3027 | 22.8 | 22.1-23.5 |
| No Risk (20-35 Years Old) | 10242 | 77.2 | 76.5-77.9 |
| Mother's Education Level | | | |
| Low | 10813 | 81.5 | 80.8-82.2 |
| High | 2456 | 18.5 | 17.8-19.2 |
| Economic Status | | | |
| Low | 5873 | 44.3 | 43.4-45.1 |
| Moderate | 2653 | 20.0 | 19.3-20.7 |
| High | 4743 | 35.7 | 34.9-36.6 |
| Parity | | | |
| At risk (1 and >3 children) | 6286 | 47.4 | 46.5-48.2 |
| No Risk (2-3 children) | 6983 | 52.6 | 51.8-53.5 |
| Gestational Interval | | | |
| At risk (<2 years) | 801 | 8.9 | 8.3-9.5 |
| No Risk (\geq 2 years) | 8202 | 91.1 | 90.5-91.7 |
| Gemelli | | | |
| Yes | 81 | 0.6 | 0.5-0.7 |
| No | 13188 | 99.4 | 99.3-99.5 |
| Abortion History | | | |
| Ever Aborted | 2026 | 15.3 | 14.7-15.9 |
| Never Abort | 11243 | 84.7 | 84.1-85.3 |
| History of Pregnancy Complications | | | |
| Yes | 2355 | 17.7 | 17.1-18.4 |
| No | 10914 | 82.3 | 81.6-82.9 |
| Quality of ANC Service | | | |
| Bad | 10928 | 82.4 | 81.7-83.0 |
| Good | 2341 | 17.6 | 17.0-18.3 |
| Quantity of ANC Service | | | |
| Bad (<4 times) | 970 | 7.3 | 6.9-7.8 |
| Good (\geq 4 times) | 12299 | 92.7 | 92.2-93.1 |

Average of mother age is 29.8 years old, and mother was check to antenatal care 8.24 times during pregnancy (Table 2).

Table 2. Characteristics of Mother During Pregnancy

| Variable | Mean | SD | Min | Max | 95% CI |
|-------------------------|-------|-------|------|-------|-------------|
| Mother's Age | 29.08 | 6.314 | 15 | 48 | 28.97-29.19 |
| Parity | 2.29 | 1.346 | 1 | 12 | 2.27-2.32 |
| Gestational Interval | 5.77 | 3.358 | 0.75 | 28.42 | 5.70-5.84 |
| Quantity of ANC Service | 8.24 | 3.313 | 1 | 40 | 8.19-8.30 |

Based on research analysis, only the history of abortion ($P = 0.183$) and quality of antenatal care ($P = 0.190$) did not have a significant relationship with the occurrence of LBW. The other variables were maternal age ($P = 0.021$), maternal education level

($P < 0.001$), economic status ($P < 0.001$), parity ($P < 0.001$), gestational interval ($P = 0.031$), Gemelli ($P < 0.001$), history of complications ($P < 0.001$), and quantity of ANC services ($P < 0.001$) had a significant relationship with the occurrence of LBW (Table 3).

Table 3. Determinants of Low Birth Weight

| Variable | LBW Status | | | | Total n | OR | 95% CI | P- Value |
|---|------------|------|--------|------|------------|--------|---------------|-------------|
| | LBW | | Normal | | | | | |
| | n | % | n | % | | | | |
| Mother's Age | | | | | | | | |
| At risk | 242 | 8.0 | 2785 | 92.0 | 3027 | 1.199 | 1.030-1.397 | 0.021 |
| No Risk | 692 | 6.8 | 9550 | 93.2 | 10242 | | | |
| Mother's Education Level | | | | | | | | |
| Low | 806 | 7.5 | 10007 | 92.5 | 10813 | 1.465 | 1.209-1.775 | <0.001 |
| High | 128 | 5.2 | 2328 | 94.8 | 2456 | | | |
| Economic Status | | | | | | | | |
| Low | 495 | 8.4 | 5378 | 91.6 | 5873 | 1.593 | 1.364-1.861 | <0.001 |
| Moderate | 180 | 6.8 | 2473 | 93.2 | 2653 | | | |
| High | 259 | 5.5 | 4484 | 94.5 | 4743 | | | |
| Parity | | | | | | | | |
| At risk | 505 | 8.0 | 5781 | 92.0 | 6286 | 1.335 | 1.168-1.525 | <0.001 |
| No Risk | 429 | 6.1 | 6554 | 93.9 | 6983 | | | |
| Gestational Interval | | | | | | | | |
| At risk | 68 | 8.5 | 733 | 91.5 | 801 | 1.348 | 1.036-1.755 | 0.031 |
| No Risk | 528 | 6.4 | 7674 | 93.6 | 8202 | | | |
| Gemelli | | | | | | | | |
| Yes | 48 | 59.3 | 33 | 40.7 | 81 | 20.196 | 12.898-31.624 | <0.001 |
| No | 886 | 6.7 | 12302 | 93.3 | 13188 | | | |
| Abortion History | | | | | | | | |
| Ever Aborted | 128 | 6.3 | 1898 | 93.7 | 2026 | 0.873 | 0.720-1.059 | 0.183 |
| Never Abort | 806 | 7.2 | 10437 | 92.8 | 11243 | | | |
| History of Pregnancy Complications | | | | | | | | |
| Yes | 261 | 11.1 | 2094 | 88.9 | 2355 | 1.897 | 1.632-2.205 | <0.001 |
| No | 673 | 6.2 | 10241 | 93.8 | 10914 | | | |
| Quality of ANC Service | | | | | | | | |
| Bad | 754 | 6.9 | 10174 | 93.1 | 10928 | 0.890 | 0.751-1.054 | 0.190 |
| Good | 180 | 7.7 | 2161 | 92.3 | 2341 | | | |
| Quantity of ANC Service | | | | | | | | |
| Bad | 108 | 11.1 | 862 | 88.9 | 970 | 1.740 | 1.408-2.152 | <0.001 |
| Good | 826 | 6.7 | 11473 | 93.3 | 12299 | | | |

Further analysis, the variables suspected as confounding with the order of removing the variables from the largest to the smallest, namely history of abortion, parity, maternal age, quality of ANC services, and lastly, the quantity of ANC services, to obtain a fit model. After the confounding control process, none of the confounding variables were found, so a fit determinant model was obtained (Table 4).

Table 4. Final Model of Determinants of Low Birth Weight After Confounding Control

| Variable | B | P | OR | 95% CI |
|-----------------------------------|--------|--------|--------|---------------|
| Low Education Level | 0.458 | 0.002 | 1.581 | 1.180-2.117 |
| High Economic Status (references) | | 0.001 | | |
| Low Economic Status | 0.411 | <0.001 | 1.509 | 1.225-1.859 |
| Medium Economic Status | 0.222 | 0.091 | 1.248 | 0.965-1.615 |
| Pregnancy Distance < 2 years | 0.337 | 0.016 | 1.401 | 1.066-1.842 |
| Gemelli | 3.110 | <0.001 | 22.428 | 14.145-35.561 |
| Low Education Level | 0.645 | <0.001 | 1.906 | 1.569-2.315 |
| Constant | -3.545 | <0.001 | 0.029 | |

Note: $R^2 = 6,7\%$

The probability model of binary logistic regression can be formulated as follows:

$$P(x) = 1/(1+e^{-y})$$

Information:

e = 2,718

y = -3.545 + 3.110 (gemelli) + 0.645 (history of pregnancy complications) + 0.458 (education level) + 0.411 (economic status) + 0.337 (distance of pregnancy).

The probability of the occurrence of low birth weight will be smaller when a person does not have gemelli risk factors. The probability of predicting the occurrence of low birth weight is at its minimum point if a person does not have all the above risk factors of 2.8%. On the other hand, if a person has all the above risk factors, the probability of predicting the occurrence of low birth weight is 80.5% (Figure 2).

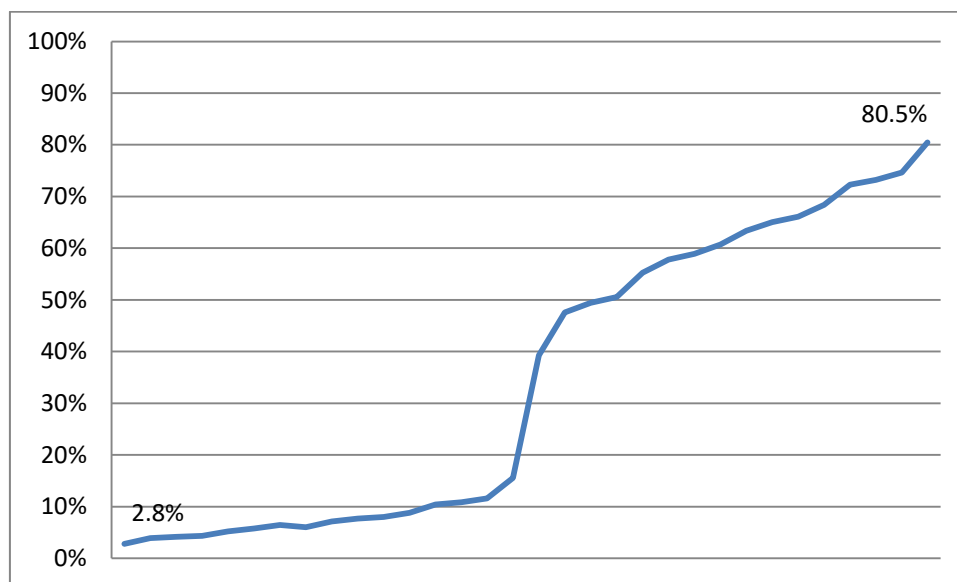


Figure 2. The Probability of Low Birth Weight in Indonesia Based on Dominant Risk Factors

Based on the results of the research, the diagnostic performance with ROC evaluation on the low birth weight determinant prediction model obtained a very high level of specificity (AUC = 0.638; Sensitivity = 0.074; Specificity = 0.996) (Figure 3).

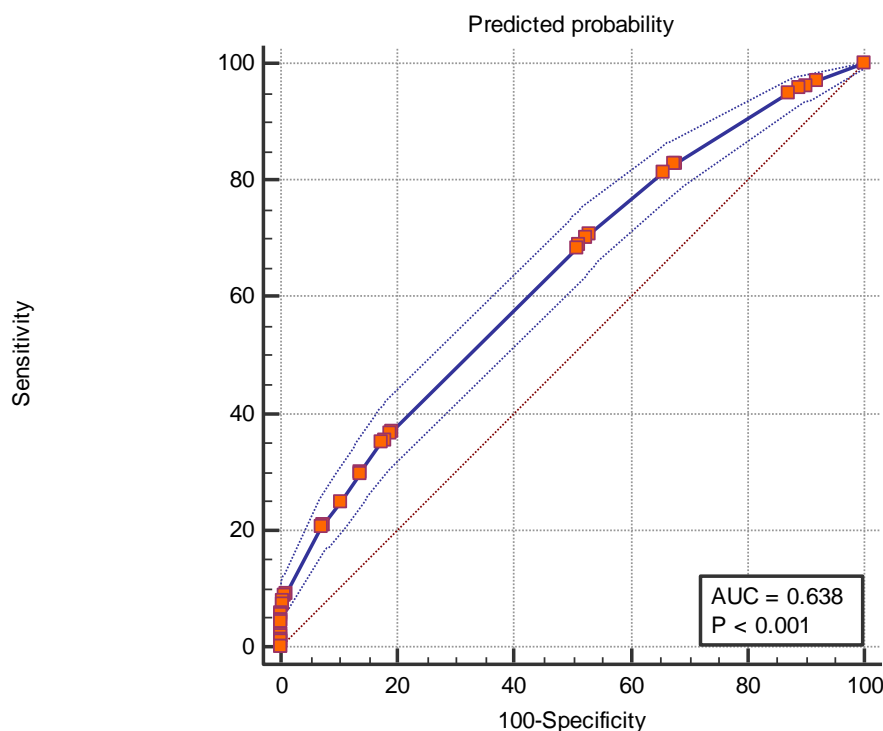


Figure 3. ROC Curve Prediction Model for Low Birth Weight Determinants in Indonesia

DISCUSSION

Based on the multivariate analysis that has been carried out using binary logistic regression, it is found that the Gemelli variable is the dominant variable for the occurrence of low birth weight in Indonesia. Mothers with Gemelli status had a 22.428-times greater risk of giving birth to children with low birth weight than non-Gemelli mothers ($P < 0.001$). Gemelli's status is at risk for low birth weight (Maidartati et al., 2019).

Mothers with Gemelli status are more likely to be implicated in excessive uterine distension. Therefore, it is not uncommon for mothers to experience premature labor and struggle with nutrition (Tonasih & Kumalasary, 2018), increase IUGR, abnormal presentation, congenital abnormalities, and trigger complications (Kesavan & Devaskar, 2019). Simultaneously, mothers with Gemelli status will have an increased incidence of pregnancy complications (Permana & Wijaya, 2019).

Mothers with low education do not have sufficient knowledge about the care of mothers with Gemelli status and preventive behavior for pregnancy complications (Jumhati & Novianti, 2018). This low level of education will lead to a low economic status, so with this low economic status, the fulfillment of nutrition for the mother and fetus is not optimal (Permatasari et al., 2021). The status of Gemelli and pregnancy complications will be exacerbated if you have a close pregnancy distance (< 2 years) because it causes inadequate maternal nutrition and the condition of the uterus has not recovered, thus increasing the risk of low birth weight (Susanti, 2018).

Based on predictive modeling, if the mother has all the risk factors in the form of Gemelli status, has a history of pregnancy complications, low education level, low economic status, and a pregnancy interval of under 2 years, she has a probability of low birth weight of 80.5%. However, the fitted model still has weak diagnostic performance

(AUC = 0.638, sensitivity = 0.074, and specificity = 0.996). A more robust methodological approach as well as the addition of variables to the risk factors for low birth weight will help increase the sensitivity of the predictive model (Hassen et al., 2020).

In the study of Yadav & Lee, (2013), the diagnostic performance of predictive models based on aspects of blood pressure has a sensitivity and specificity of 70%. However, after the addition of maternal factors such as age, ethnicity, monthly family income, and BMI before pregnancy, the diagnostic performance of the model increased with a sensitivity of 80% and specificity of 75%. Many variables have not been studied in this study to improve the diagnostic performance of the predictive model.

In the study of Kitsantas et al., (2006), the sensitivity was at least 63.7% with monitoring of maternal weight during pregnancy, health problems, ethics, smoking status, parity, marital status, and education level as predictors of low birth weight variables. The research of Singh et al., (2014) showed a sensitivity of 65% and a specificity of 84% with a model in the form of inadequate maternal weight during pregnancy, inadequate protein intake, having a history of premature birth, having a history of low birth weight babies, anemic mothers, and passive smoking. However, the incidence of low birth weight can be prevented based on the main risk factors based on aspects of family planning.

Interventions for mothers with Gemelli status and those who have a history of pregnancy complications need to be emphasized by paying attention to the fulfillment of maternal nutrition during pregnancy and strengthening the quality of ANC (Hartiningrum & Fitriyah, 2018). ANC services in China have nutritional fulfillment programs in addition to consuming Fe tablets, namely in the form of consuming folic acid supplements, controlling alcohol, controlling cigarette exposure, and controlling lifestyle (Pei et al., 2016). In terms of maternal nutrition, based on a systematic review study, multiple micronutrient (MMN) supplements can reduce the risk of low birth weight more effectively than folic acid supplements (Lopes et al., 2017).

Therefore, the program in Indonesia needs to be modified, namely, in addition to giving Fe tablets, it is important to give MMN supplements as a mandatory program. MMN supplements meet daily nutrients such as vitamin A, vitamin B1, vitamin B2, niacin, vitamin B6, vitamin B12, folic acid, vitamin C, vitamin D, vitamin E, copper, selenium, and iodine with iron and zinc with reduced LBW in the range of 11%-14% and BBJR in the range of 10%-17% (Lopes et al., 2017). Mothers with a high level of education can improve the economic status of their families.

In addition, mothers with higher education will be able to make decisions about their reproductive health, including visits to health services (Siramaneerat et al., 2018). In the national implementation program in "health and clinical centers of the country under the supervision of the Iranian Ministry of Health", mothers with various levels of education, as well as pregnant women, must know about maternal and child health. The "family physician" program has an important role in face-to-face education to control risk factors for low birth weight (Hajizadeh et al., 2017).

The strengthening of exclusive breastfeeding programs for 2 years or more needs to be strengthened to control the optimal spacing of pregnancies (Tarigan et al., 2017).

CONCLUSION

LBW in Indonesia is still very high. Additionally, the mother's education level is still at low level, her economic status is low, and the quality of antenatal care services is

poor. Diagnostic performance with ROC evaluation on the predictive model of low birth weight determinants obtained a very high specificity power. Mothers with Gemelli status need to be the main focus of program modifications, namely, in addition to giving Fe tablets, it is necessary to provide multiple micronutrient (MMN) supplements and control alcohol, cigarette exposure, and lifestyle during pregnancy to reduce the risk of low birth weight. Subsequent research suggests formulating intervention models based on the risk factors that have been found.

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Original Research

The Effect Water Consumption On Reduction Of Leukocyte And Nitrite Levels Of Pregnant Women's Urine

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ABSTRACT

Background: *The incidence of asymptomatic bacteria in the population of pregnant women is around 70%, and the assessment of mortality in the world is similar. One effort that can be made is by consuming water in sufficient quantities to help rinse and dilute urine. This study aimed to analyze differences in urine levels (leukocytes and nitrite) as an indicator of asymptomatic bacteria before and after being given treatment.*

Methods: *This study used a quasi-experimental design with a pre-post-test control group approach. A sample of 32 people was divided into two groups. The intervention group was given scheduled water consumption treatment, and the control group was given an educational intervention related to water consumption. The sample selection using a survey technique means that all pregnant women are tested for urine, and those who meet the inclusion criteria are selected as respondents. This research was conducted in the working area of the West Sorong Health Center, involving 32 respondents who were divided into 2 groups. Collecting data using observation sheets Analysis using the Chi-Square test*

Results: *There was a significant effect on the nitrite value (p-value 0.022) in pregnant women who consumed scheduled water, but it did not significantly affect the leukocyte value (p-value 0.904).*

Conclusion: *Pregnant women who consume water regularly (2 liters a day) will have lower levels of nitrite and leukocytes than pregnant women who do not consume water on a scheduled basis.*

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INTRODUCTION

Referring to the SDGs goal, to reduce morbidity and mortality of pregnant women, WHO 2016 recommends quality ANC services by developing 39 recommendations, one of which is a maternal and fetal assessment by examination of UTI (*asymptomatic bacteriuria*) in pregnant women (Meditory & Issn Online, 2018). The incidence of *asymptomatic bacteriuria* is about 70% in the population of pregnant women and contributes to a mortality rate of about 150 million per year in the world.

Premature delivery, low birth weight, intrauterine growth retardation, and IUGR have impacts on infants. Whereas in mothers, it can cause anemia, *preeclampsia*, kidney failure, and *septicemia* (Owens et al., 2019).

Screening is important so that early treatment can be given in an effort to reduce the risk of complications (Azami et al., 2019). A cohort study reported the incidence of congenital malformations, jaundice, and respiratory distress in a group of unscreened mothers (Owens et al., 2019). Pregnant women are prone to suffer from asymptomatic bacteriuria, this is because an increase in the hormone progesterone causes relaxation of the smooth muscles of the urinary tract, thereby increasing colonization of the urinary tract by organisms (Izuchukwu, Oranu, Bassey, & Orazulike, 2017). The increase in plasma volume also causes a decrease in urine concentration by up to 70%, which makes bacteria easy to grow (Salari, Salari, & Medicine, 2017).

Consumption of water in sufficient quantities can help rinse and dilute urine, thereby helping to eradicate bacteria from the urinary tract (Fakhrizal, 2018). In addition, by consuming water, it becomes a reserve in the large intestine so that it helps the digestive system and softens the stool so that it can handle constipation. A study conducted by Fitriana, Prasetyo, & Purwaka, (2018) showed that a lack of fluid consumption in pregnant women can increase the risk of constipation by 1.85 times (Fitriana et al., 2018).

In the United States, 900 people die each year due to the effects of constipation due to a lack of water consumption (Woodward S, 2017). In the population of pregnant women, constipation occurs in about 50% -60%, and pressure on the abdomen and hormonal changes are strongly suspected as triggering factors (Chuhareva, Bontsevich, Esayan, Shchurovskaya, & Lysenko, 2016). Management of constipation can be done with lactulose therapy, senna, and macrogol preparations. However, giving this treatment is not safe because it causes the risk of premature birth, hyponatremia, or hypokalemia, so doctors have decided not to prescribe it (Chuhareva et al., 2016).

Based on POGI recommendations, water consumption in the first trimester is 2180 mL/day, while in the second and third trimesters it is 2300 mL/day. Research conducted at RSUD DR. M. Yunus, 2019 shows that the average respondent already has a drinking habit, but his habit of not meeting the daily target is sometimes a lot or sometimes a little (Lina & Lestari, 2019). In addition, there is still a belief in the community that consuming a lot of water will slow down the healing process of perineal wounds (Rochima Hadi, 2017).

Based on previous research, it has been shown that pregnant women have a habit of drinking enough water and tend to be good. This is influenced by the adequacy of the information obtained (Rochima Hadi, 2017). Education related to efforts to maintain body health during pregnancy must be carried out as long as the mother makes antenatal care visits according to standards (Nurhidayati & Suprayitno, 2020). Research that directly analyzes the effect of water consumption on urine content has never been done, so this research is an initial study with the hope that it can be an initial reference for further research. Previous studies have concentrated on the effect of water consumption on the prevalence of constipation.

A preliminary study conducted in January 2021 showed that, on average, the public health center in Sorong City had not screened for *asymptomatic bacteriuria*. The importance of drinking water, the lack of awareness, the existence of negative beliefs, the magnitude of the impact, the lack of a daily consumption target, and the need for early treatment of *asymptomatic bacteriuria* using natural ingredients are the reasons for

the urgency of this study. Research related to water consumption has been widely published in national and international journals, but research related to the provision of scheduled water consumption interventions for the treatment of asymptomatic bacteriuria specifically in pregnant women has never been done. For this reason, the purpose of this study was to analyze the effect of the scheduled water consumption method on the treatment of asymptomatic bacteriuria in pregnant women.

MATERIALS AND METHOD

This research design is quasi-experimental with a pretest-posttest control group design technique (Mieke.H.Satari, 2011). The study population was all pregnant women at the West Sorong Health Center. The research sample consisted of 32 respondents who were divided into the intervention group and the control group and who met the inclusion criteria, including pregnant women who were positive for symptomatic bacteria. The intervention group was given a schedule for drinking water consumption of 2 liters per day for 28 days, while the control group was given education about the importance of drinking water.

Researchers initially conducted urine examinations for all pregnant women, and if they were found positive for symptomatic bacteria, they were taken as research subjects. The data collection technique uses daily observation sheets to measure scheduled water consumption, for that reason, validity and reliability tests are not carried out because the instrument used is not a questionnaire. This research was conducted in the working area of the West Sorong Health Center for 1.5 months, starting from July 5 to August 16, 2022, according to the Posyandu schedule.

Univariate data analysis was used to describe the characteristics of respondents, including age, pregnancy, and gestational age, as well as the assessment of leukocyte and nitrite levels as indicators of the incidence of asymptomatic bacteria before and after the intervention, which was given to both groups. Meanwhile, bivariate analysis was used to analyze the effect of scheduled drinking water consumption in the intervention and control groups, using a paired T-test of the data. This research has received ethical approval from the ethics committee of the Health Polytechnic of the Ministry of Health of Sorong with the number DM.03.05/6/002/2022.

RESULTS

This research is a quasi-experimental pre-post test with a control group design. The population of this study was normal pregnant women, and the sample of the study was normal pregnant women in the East Sorong Health Center Work Area. The research sample consisted of 2 groups: the treatment group, which consisted of pregnant women who received an intervention in the form of drinking 2000 ml of water per day for 28 days (16 people), and the control group, which consisted of pregnant women who did not drink 2000 ml of water per day (16 people).

Measurement of bacteriuria in pregnant women using a dipstick Ronche Combur test 10 indicators. Bacteriuria predictors in pregnant women were assessed using two indicators, namely the results of leukocyte and nitrite examinations. The presence of leukocytes in the urine is a predictor of inflammation in the urinary tract, while the presence of nitrite is a predictor of gram-negative bacteria.

The data that have been obtained were analyzed, including the analysis of the equality of respondents using the Chi-Square test, the different tests of leukocyte and nitrite values before (pre) and after (post) intervention using the Wilcoxon test, and the

analysis of the effect of giving water on the decrease in leukocyte and nitrite values using the Chi-Square. All analyzes were performed using SPSS 16 for Windows ($\alpha = 0.05$). For more details, the characteristics of the respondents can be seen in Table 1 below:

Table 1. Respondent Characteristics

| Characteristics | Intervention | | Control | | p-value |
|------------------------|--------------|------|---------|------|---------|
| | n | % | n | % | |
| Age | | | | | |
| <20 years | 2 | 12,5 | 1 | 6,2 | 0,717 |
| 20-35 years | 13 | 81,2 | 13 | 81,2 | |
| >35 years | 1 | 6,2 | 2 | 12,5 | |
| Gravida | | | | | |
| Primigravida | 5 | 31,2 | 0 | 0 | 0,087 |
| Multigravida | 8 | 50 | 12 | 75 | |
| Grandemultigravida | 3 | 18,8 | 4 | 25 | |
| Gestational Age | | | | | |
| Trimester 1 | 2 | 12,5 | 1 | 6,2 | 0,824 |
| Trimester 2 | 9 | 56,2 | 10 | 62,5 | |
| Trimester 3 | 5 | 31,2 | 5 | 31,2 | |

Table 1 shows that the majority of respondents in this study were in the age range of 20–35 years, the majority were multigravida mothers, and the majority had gestational ages in the 2nd trimester in both groups. A different characteristic test was conducted between the two groups, with the result that there was no significant difference between the two groups ($p\text{-value} > 0.005$), so the two groups could be compared.

Table 2. Indicators of *Asymptomatic Bacteria* in Pregnant Women before Treatment in the Intervention and Control Group

| Urine Measurement Parameters | Intervention Group | | | | Control Group | | | | |
|------------------------------|--------------------|--------|-------|------|---------------|-------|-------|------|-------|
| | Pre | | Post | | Pre | | Post | | |
| | n | % | n | % | n | % | n | % | |
| Leukocytes | 0 | 0 | 1 | 6,25 | 2 | 12,5 | 2 | 12,5 | |
| | +1 | 5 | 31,25 | 2 | 12,5 | 2 | 12,5 | 2 | 12,5 |
| | +2 | 3 | 18,75 | 5 | 31,25 | 4 | 25 | 4 | 25 |
| | +3 | 8 | 50 | 8 | 50 | 8 | 50 | 8 | 50 |
| | <i>p-value</i> | 0,773 | | | | 0,603 | | | |
| Nitrite | Positive | 7 | 43,75 | 2 | 12,5 | 1 | 6,25 | 1 | 6,25 |
| | Negative | 9 | 56,25 | 14 | 87,5 | 15 | 93,75 | 15 | 93,75 |
| | <i>p-value</i> | 0,025* | | | | 1 | | | |

In Table 2, leukocyte examination shows that in the treatment group there was an increase in the number of pregnant women with negative leukocyte results, from none (0%) to 1 (12.5%). In the treatment group, there was no increase in the number of pregnant women with negative leukocyte results. The difference test in the two groups

showed that there was no significant difference before and after treatment (*p*-value, leukocytes, 0.773 vs. nitrite, 0.603).

Table 2 shows of nitrite examination that in the treatment group the results of nitrite examination before treatment with a positive value of 7 people (43.75%), decreased to 2 people (12.5%). While in the control group, there was no change. The difference test between the two groups revealed a significant difference (*p*-value 0.025) before and after treatment in the group of pregnant women who consumed 2000 mL of water per day.

Table 3. The effect of 2000 ml/day water consumption on leukocyte values in pregnant women

| Group | Leukocyte | | | | | | <i>p</i> -value |
|-----------|-----------|------|----------|------|-------|------|-----------------|
| | Increase | | Decrease | | Fixed | | |
| | n | % | n | % | n | % | |
| Treatment | 4 | 25 | 4 | 25 | 8 | 50 | 0,904 |
| Control | 4 | 25 | 3 | 18,8 | 9 | 56,2 | |
| Nitrite | | | | | | | |
| Treatment | 11 | 68,8 | 5 | 31,2 | | | 0,022* |
| Control | 16 | 100 | 0 | 0 | | | |

Table 3 shows that in the treatment group, there were 4 people (25%) who experienced a decrease in the value of leukocytes, while in the control group, only 3 people (18.8%) experienced a decrease in the value of leukocytes. The results of the nitrite examination showed that in the treatment group there were 5 (31.2%) pregnant women with positive nitrite values that decreased to negative.

DISCUSSION

Based on the analysis that has been done, it shows that the consumption of 2000 ml/day of water in pregnant women has a significant effect on the nitrite value (*p*-value 0.022), but does not significantly affect the leukocyte value (*p*-value 0.904). The results of this study are based on several factors, the assumptions of the researchers include the characteristics of the respondents, monitoring during the intervention, and the amount of water consumed. Characteristics of respondents based on age, mostly between 20-35 years old in both the control group and the intervention group.

This is an age that has a low potential for urinary tract infections, both symptomatic and asymptomatic. This is based on research conducted by Putri Vidiarsi Darsono in 2016, which showed that the prevalence of urinary tract infections at the age of fewer than 40 years was lower (3.2%) compared to those aged over 65 years (20%) (Vidiarsi Darsono, 2016). Based on characteristics of respondents based on gravida or number of children, a study conducted by Siti Maesaroh, (2011) showed that there was a significant relationship between parity and the incidence of UTI in pregnant women, where multiparous women had a 2.64 times greater risk of experiencing UTI compared to primiparas (S. Maesaroh Dan K. Fatmala, 2011).

In this study, most respondents were in the category of *multigravida* and *grand multipara*, both in the intervention group and the control group. So this strengthens the occurrence of urinary tract infections or the presence of bacteria in the urine. Pregnancy directly affects germs growing in urine at <105 CFU/mL⁹. Pregnant women with *preterm* pregnancies found the number of germs in their urine was 3 times greater than 105 CFU/mL (Anak Agung, 2018).

This means that pregnancy has a huge potential for urinary tract infections, both symptomatic and asymptomatic, regardless of the number of children or gravida. Characteristics of respondents Based on the trimester of pregnancy, there is no source that supports the assumption that increasing gestational age will increase the risk of urinary tract infections or *asymptomatic bacteria*. Most of the respondents in this study were in the second trimester, both in the intervention group and the control group.

Based on research conducted by Anak Agung, (2018) shows that pregnant women in the third trimester suffer more from UTIs than in the first and second trimesters. This result is contrary to the results obtained by the researcher, meaning that the trimester of pregnancy cannot be used as a guideline (Anak agung, 2018). Another assumption from the researcher is that the composition of the drinking water consumed by the respondents is not the same, based on the results of brief interviews with several respondents showing that some consume rainwater, gallon water, and PAM water.

This can affect the results of the examination, but the researcher did not examine the composition of each water consumed for reasons of limited time and funding. Generally, drinking water is water that is used for human consumption. The requirements for drinking water, according to the Ministry of Health of the Republic of Indonesia, are that it be tasteless, odorless, colorless, do not contain heavy metals and chemical compounds such as nitrate or nitrite (Sisca, (2016) quoted (Ita Emilia, 2019).

The maximum recommended level of nitrate and nitrite in drinking water is 0.06 mg/L (Government Regulation of the Republic of Indonesia Number 82, 2001). Excessive consumption of nitrite can cause *methemoglobinemia* and toxic effects (Soeparman, 2001, cited in (Ita Emilia, 2019). The research time, which was quite long (28 days), caused the researcher not to be able to monitor drinking water consumption adequately.

This can lead to the researcher's assumption that there is non-compliance in the intervention group's consumption of drinking water on a scheduled basis. This is also a limitation of the study. The leukocyte esterase and nitrite test in urine is an examination that can provide results quickly, relatively inexpensively, and easily compared to examination with urine culture (Gold standard) which is expensive and time-consuming (Li et al., 2020).

The urine dipstick test is able to detect leukocyte esterase as an indicator of pyuria and nitrite as an indicator of bacteriuria. Nitrate will turn into nitrite due to the presence of bacteria that produce nitrate reductase enzymes, including gram-negative bacteria such as *Escherichia*, *Enterobacter*, *Citrobacter*, *Proteus*, *Klebsiella*, and *Pseudomonas* (Li et al., 2020). This means that this test can be used as a substitute for the gold standard in diagnosing bacteria in urine and can be used by midwives at primary or primary health facilities.

CONCLUSION

There was no significant difference in leukocyte values before and after consuming scheduled water in the treatment and control groups (p-value leukocytes 0.773 vs. nitrite 0.603), but there was a significant difference in nitrite values before and after treatment in the treatment group (p-value 0.025). There is a significant effect on the value of nitrite (p-value 0.022) in pregnant women who consume scheduled water, but it has no significant effect on the leukocyte value (p-value 0.904).

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Original Research

Are Children Born By Sectio Caesarea (SC) Correlated With Respiratory And Autoimmune Diseases?

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ABSTRACT

Background: The incidence of pulmonary and autoimmune diseases tends to be higher, which is hypothetically associated with the increasing trend of cesarean sections in our society.

Methods: This study design is analytical with a case-control approach using the odds ratio method. The study population consisted of 90 sick infants and babies, and 44 samples were obtained through a purposive sampling process with the following inclusion criteria: infants aged 0-12 months, respiratory disease (asphyxia, pneumonia, bronchopneumonia, bronchitis), autoimmune disease, rheumatoid arthritis, systemic lupus erythematosus (SLE), type-1 diabetes, multiple sclerosis (MS), Graves' disease.

Results: Most infants were born with the Sectio Caesarea method of delivery; almost all infants have respiratory disease; a small number of infants suffer from autoimmune disease; most mothers who give birth with the Sectio Caesarea method are at risk of giving birth to infants with respiratory diseases. Infants born via Sectio Caesarea (SC) have a 0.590 or 0.6 times greater risk of respiratory disease than infants born via vaginal delivery; a small proportion of mothers who give birth via Sectio Caesarea (SC) are at risk of giving birth to babies with autoimmune diseases. Infants born via Sectio Caesarea (SC) have a 1.696 or 1.7 times greater risk of developing autoimmune disease than infants born via vaginal delivery.

Conclusion: There is a relation between Sectio Caesarea (SC) and the incidence of respiratory and autoimmune diseases in infants at Kanjuruhan Hospital, Kepanjen Malang.

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INTRODUCTION

Indonesia is one of the developing countries with the highest infant mortality rate (IMR). Based on BPS data, East Java IMR is 29.24 per 1.000 live births. Efforts to descend IMR in an area require efforts to reduce the infant's morbidity first. A high infant morbidity rate triggers a high infant mortality rate (IMR). Because of their weakened immune systems, infants aged 0 to 12 months have a more severe disease infection.

Respiratory and autoimmune diseases in infants can be prevented by the normal delivery process (vaginal). Infants who were born by vaginal delivery are exposed to microbiota (good bacteria) from the mother's vagina. While infants who were born with Sectio Caesarea lose their natural goodness because they were born through the abdomen babies or infants born by Sectio Caesarea (SC) are at higher risk of suffering respiratory and immune diseases (C. A. J et al., 2016).

Cesarean delivery is associated with an increased risk of asthma or another respiratory disease (S. A, J, K, & H., 2015). From a previous study, Sectio Caesarea (SC) delivery causes asphyxia in newborns (F, 2015). Delivery by the Sectio Caesarea (SC) method is associated with an increased risk of asthma or respiratory disease (S. A. et al., 2015) (MC, SE, & H, 2011). Babies born with Sectio Caesarea (SC) can still get good bacteria as in normal or vaginal delivery, namely through the C-Section method, and this method is believed to reduce the risk of asthma or respiratory disease (S. A et al., 2015) (MC et al., 2011).

Another study said that the C-Section methods is in causing the transmission of pathogenic bacteria? One case was reported to have contracted herpes simplex virus infection by the section method (H. J., P, & B, 2018). The benefits of C-Section are still debated and require further research (M et al., 2019). Previous research has shown that the Sectio Caesarea (SC) method of delivery increases the risk of asthma.

However, in this study, the Sectio Caesarea (SC) method of delivery increased the risk of respiratory tract disease not specifically in asthma but in other respiratory tract diseases, namely asphyxia, pneumonia, and bronchiolitis. Based on the background, researchers are interested in examining the correlation between children born by section Caesarea with respiratory and autoimmune diseases.

MATERIALS AND METHOD

This research was conducted in February-October 2021 at Kanjuruhan Hospital. There are two research ethics Polkesma ethics and Kanjuruhan Hospital ethics. The medical record was taken after passing an ethical clearance. The design of this research is analytical with a case-control approach using the odds ratio method. The research data on respiratory and autoimmune diseases suffered by infants were obtained from medical records, processed and presented in tabular form, and analyzed descriptively.

Meanwhile, data about sectio Cesarea (CS) and the risk of respiratory and autoimmune diseases were statistically analyzed using the odds ratio test. The study population was 90 sick infants, by purposive sampling process obtained 44 samples with inclusion criteria: infants aged 0-12 months, respiratory disease (asphyxia, pneumonia, bronchopneumonia, bronchitis), autoimmune disease, Rheumatoid arthritis, Systemic lupus erythematosus (SLE), type-1 diabetes, multiple sclerosis (MS), graves' disease, psoriasis, scleroderma, pernicious anemia (PA), glomerulonephritis, thyroiditis Hashimoto, HIV-AIDS.

RESULTS

Based on table 1 it is known that of the 44 respondents, most of infants (65%) were born by the Sectio Caesarea (SC).

Table 1. Sectio Caesarea Delivery Method

| Sectio Caesarea (SC) Delivery Method | Frequency (f) | Percentage (%) |
|---|----------------------|-----------------------|
| Yes | 29 | 65,9 |
| No | 15 | 34,1 |
| Total | 44 | 100 |

Based on table 2 it is known that of the 44 respondents, almost all the infants 36 (81.9%) are having respiratory diseases and only a small amount 8 (18.1%) of the infants suffered from autoimmune disease.

Table 2. Infant Respiratory Disease and Autoimmune Disease

| Disease infant | Infant Respiratory Disease | | Autoimmune Disease | |
|-----------------------|-----------------------------------|-----------------------|---------------------------|-----------------------|
| | Frequency (f) | Percentage (%) | Frequency (f) | Percentage (%) |
| Yes | 36 | 81,9 | 8 | 18,1 |
| No | 8 | 18,1 | 36 | 81,9 |
| Total | 44 | 100 | 44 | 100 |

Table 3. The relationship between Sectio Caesarea (SC) to the infant respiratory tract disease and the infant autoimmune disease

| Sectio Caesarea (SC) method of delivery | Infant Respiratory Disease | | | | Odds Ratio | Infant Respiratory Disease | | | | Odds Ratio | Total | |
|--|-----------------------------------|-------------|-----------|-------------|-------------------|-----------------------------------|-------------|-----------|-------------|-------------------|--------------|------------|
| | Yes | | No | | | Yes | | No | | | N | % |
| | N | % | N | % | N | % | N | % | | | | |
| Yes | 23 | 52,3 | 6 | 13,6 | 0.590 | 6 | 13,6 | 23 | 52,3 | 1.696 | 29 | 65,9 |
| No | 13 | 29,6 | 2 | 4,5 | | 2 | 4,5 | 13 | 29,6 | | 15 | 34,1 |
| Total | 36 | 81,9 | 8 | 18,1 | | 8 | 18,1 | 36 | 81,9 | | 44 | 100 |

Based on Table 4, it is known that of 44 respondents, 23 (52.3%) mothers who give birth by Sectio Caesarea (SC) are at risk of giving birth to babies with respiratory diseases. The odds ratio value of 0.590 means that babies born by the Sectio Caesarea (SC) have a tendency to suffer from respiratory diseases by 0.590 or 0.6 times greater than babies born normally (vaginal) and a small proportion of 6 (13.6%) mothers who give birth by Sectio Caesarea (SC) are at risk of giving birth to babies with autoimmune diseases. The Odds Ratio value of 1.69, means that babies born with the Sectio Caesarea (SC) have a tendency to suffer from Autoimmune disease of 1.696 or 1.7 times greater than babies born normally (vaginal).

DISCUSSION

C-Section or Sectio Caesarea (SC)

The results showed that most (65%) infants were born by Sectio Caesarea (SC). A cesarean section is an operative procedure that is performed under anesthesia so that the fetus, placenta, and membranes are delivered through an incision in the abdominal wall and uterus (Midwives, 2011). The World Health Organization (WHO) sets the average standard for sectio cases in a country at around 5–15% per 1.000 births in the world.

Although mostly pronounced in developing and western countries, this trend is now being observed in almost all countries worldwide, including the developing nations. While most cases of C-section are unavoidable and performed for clinical indications, many cases are simply due to maternal request and might impose health risks for both the mother and the newborn (Revinder Nagpal, 2018). Riset Kesehatan Dasar (Riskesdas) in 2018 reported the incidence of sectio caesarea delivery in Indonesia was 17.6% (RI, 2019).

The Sectio Caesarea (SC) delivery rate in Indonesia has passed the maximum limit of the WHO standard of 5–15%. In developing countries, a cesarean section is the last option to save the mother and fetus during a critical pregnancy and/or delivery. The maternal mortality rate due to sectio caesarea that occurs is 15.6% of 1000 mothers and 8.7% of 1000 live births in sectio caesarea while early neonatal mortality is 26.8% per 1000 live births (Schuller RC, 2014).

Some conditions that can increase the incidence of cesarean section delivery in Indonesia such as low risk pregnancy, delivery plan with normal delivery method, because at any time low risk pregnancy can become pathological (high risk pregnancy) which requires delivery by cesarean section for medical reasons.

Respiratory disease and Autoimmune disease

The results of the study obtained almost all infants (81.9%) have respiratory diseases. Respiratory tract disease, including pneumonia and tuberculosis, remains the most cause of death in toddlers in developing countries. As fiction is the second highest cause of neonatal death (23.9%). Asphyxia neonatorum: In developing countries, approximately 4 million newborns suffer from moderate or severe asphyxia, of which 20% die. In Indonesia, where the incidence of asphyxia is approximately 40 per 1000 live births, a total of 110,000 neonates die each year due to asphyxia.

The age group most prone to respiratory disease is the age group under one year. This is understandable considering that cellular and humoral immunity have not been well developed. Autoimmune disease is an immune response that causes damage to the body's own tissues and also interferes with the physiological function of the body. Autoimmune diseases are influenced by several factors, including genetic factors, infections, environment, hormones, region or ethnicity, diet, and toxic or drug substances.

The results obtained a small amount (18.1 %) of autoimmune diseases in infants. The percentage of the incidence of autoimmune diseases in children at Sanglah Hospital Denpasar in the period of January 2015 to June 2016 was 0.22% (Diantini et al., 2016). The incidence of autoimmune diseases in infants and toddlers shows a small percentage. This shows that the incidence of autoimmune disease in infants and toddlers shows a small percentage.

The Relationship between Sectio Caesarea (SC) with the Risk of Infants Respiratory Diseases and the Risk of Infants Autoimmune Diseases

The results showed that the majority (52.3%) mothers who gave birth with the Sectio Caesarea (SC) are at risk of giving birth to babies with respiratory diseases. The odds ratio value of 0.590 means that babies born with the Sectio Caesarea (SC) have a tendency to suffer from respiratory diseases by 0.590 or 0.6 times greater than babies who were born by normal delivery (vaginal). The microbiome of infants born by Sectio

Caesarea (SC) is thought to impair the development of the infant immune system (K & I, 2016).

This contributes to their higher susceptibility to various metabolic and immune disorders later in life (Miettinen R, Hermansson H, Merikukka M, Gissler M, 2015). Babies or infants born with Sectio Caesarea (SC) tend to be more susceptible to respiratory tract disorders. TTNB (Transient Tachypnea of the Newborn) breathing disorder. This disorder occurs because the fluid that fills the fetal lungs while in the womb is not compressed, considering that the baby with Sectio Caesarea (SC) is just "terima jadi" or in English "just accepting".

The process of vaginal delivery through the birth canal is the process that allows the fluid (that fills the lungs when the fetus is in the uterus) to be pumped out. In addition, the compression process also occurs while the periodic contractions of the mother's uterus happen. These contractions, which are getting stronger over time, will put pressure on the baby's body so that the fluid in the lungs will automatically come out.

However, in infants who were born by Sectio Caesarea (SC), the two compression processes did not occur perfectly (Erick Fransisco, n.d.). Delivery by C-section or Sectio Caesarea (SC) method causes an increased risk of hereditary obesity by 34%. Besides obesity, the Sectio Caesarea (SC) has been associated with a hereditary risk of asthma and allergies. A population-based study in Denmark found C-section or section Caesarea was associated with an increased risk of asthma or respiratory disease (S. A et al., 2015).

So, delivery by Sectio Caesarea (SC) has an impact on the health of the baby, one of which is the risk of respiratory tract disease. The same thing was said in Fadhillah's 2015 study with the title "Sectio Caesarea as a Risk Factor for Neonatal Asphyxia". It was found that the incidence of asphyxia in newborns can be caused by various factors including the delivery factor with action, namely delivery by Sectio Caesarea (SC). Delivery by Sectio Caesarea (SC) method is associated with an increased risk of asthma or respiratory disease (F, 2015).

More interestingly, infants born by C-section are often found to be at more risk for various diseases such as asthma or respiratory tract disease, obesity, diabetes, and so on (R et al., 2017). In our study on Japanese infants, we also found that the levels of propionate in infants delivered via cesarean-section remain lower intermittently during the first 6 months of life as compared to vaginally delivered babies (Revinder Nagpal, 2018). The results of the study showed that a small amount (13.6%) of mothers who give birth by Sectio Caesarea (SC) are at risk of giving birth to babies with autoimmune diseases.

The odds ratio value of 1.69 means that infants born by Sectio Caesarea (SC) have a tendency to suffer from autoimmune diseases that is 1,696 or 1.7 times greater than that of infants who were born by normal vaginal delivery. C-section or Sectio Caesarea (SC) causes immune disorders in the body or autoimmune disease (L, Q, & Y, 2015). Population-based studies in Denmark have found that C-sections or Sectio Caesarea, are associated with increased risk of asthma, systemic connective tissue disorders, adolescent arthritis, inflammatory bowel diseases, immune deficiency or autoimmune diseases, and leukemia (S. A et al., 2015).

Moreover, there is significant epidemiological evidence that infants delivered by C-section are at increased risk for a range of chronic inflammatory and metabolic conditions, with the most evidence for immune deficiencies (Autoimun) and leukemia

(Słabuszewska-Jóźwiak, et al., 2020). Babies born by Sectio Caesarea (SC) are thought to have the potential to have a weaker immune system than babies born through normal delivery and are at increased risk of suffering from autoimmune diseases and respiratory tract disease (DM et al., 2017). Association between cesarean delivery and increased risk of several chronic immune diseases or autoimun suggests a shared environmental risk factor in early life.

However, it should be noted that this hypothesis is mostly based on association studies and is not yet supported by mechanistic evidence. One of the largest association studies to date assessed chronic immune disorders in 1.9 million Danish children, finding modestly higher rates of asthma, systemic connective tissue disorders, juvenile arthritis, inflammatory bowel disease, immune deficiencies, and leukemia in those born by Sectio Caesarea (SC). Further research is needed to clearly identify and address this risk factor (S. A. et al., 2015).

Babies born by Sectio Caesarea (SC) are thought to have the potential to have a weaker immune system than babies born through normal delivery and are at risk of suffering from autoimmune diseases (MG, 2016). So, delivery by Sectio Caesarea (SC) has an impact on the health of the baby, one of which is an autoimmune disease. According to the results from 44 respondents, most of the female babies (58.3%) have respiratory diseases, and most of the female babies (62.5%) have autoimmune diseases. Women account for approximately 75% of those suffering from autoimmune diseases (S, n.d.).

In SIRS online data, the Directorate General of Health Services 2017 shows the proportion of male patients at 54.3% and female patients at 45.7%. Based on these data, it can be concluded that autoimmune diseases can currently attack women at a productive age of 15–50 years (PUSDATIN, 2017). In comparison, the male to female sex ratio for people with autoimmune diseases is (1:2, 3). Gender differences in autoimmune diseases can be caused by differences between the immune systems of men and women. Men have a greater emphasis on immunity when compared to women.

Women have higher immune reactivity, which translates to greater resistance to infection and a variety of non-infectious diseases. However, there is a possibility that this greater immune reactivity makes women more vulnerable to experiencing autoimmune diseases (Ngo, S. T., and F. J. Steyn, 2014). According to the findings of a Swedish study, the number of type 1 diabetes events is relatively equal between men and women (Wandell, n.d.). Journal of Autoimmunity Reviews in August 2012 found that women get autoimmune diseases at a rate of around 2 to 1 compared to men, which is 6.4 percent of women compared to 2.7 percent of men (I. S. A, 2021).

CONCLUSION

Most mothers who give birth by Sectio Caesarea (SC) are at risk of giving birth to babies with respiratory disease, and a small percentage of them are at risk of giving birth to babies with autoimmune diseases. Previous research has shown that the Sectio Caesarea (SC) method of delivery increases the risk of asthma. However, in this study, the Sectio Caesarea (SC) method of delivery increased the risk of respiratory tract disease not specifically in asthma but in other respiratory tract diseases, namely asphyxia, pneumonia, and bronchiolitis.

Then the delivery of a Sectio Caesarea (SC) should not be done without medical reasons or indications. A Sectio Caesarea (SC) should be done as the last alternative to save the mother and baby.

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Original Research

Determinants Of Malnutrition Based On The Composite Index Of Anthropometric Failure (CIAF)

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ABSTRACT

Background: Malnutrition in toddlers (under five years) is known to cause disturbances in growth and development. The Composite Index of Anthropometric Failure (CIAF) is an alternative anthropometric that specifying and combining various growth failures that occur.

Methods: A descriptive quantitative study with a cross-sectional approach was carried out for 10 (ten) months in 2022. A total of 155 samples of toddlers (aged 6 months to 5 years) were taken using the multistage random sampling technique. The instruments used include questionnaires about the characteristics of parents, family economy, family awareness about nutrition, and health seeking behavior. The tools to detect malnutrition are a calibrated digital stature meter and weight scales. The data was analyzed through Chi Square, and Mann-Whitney is used as an alternative if the data found does not meet the requirements.

Results: Of the 155 children under five examined, 48.4% or almost half of the respondents experienced growth failure. Most growth failure was in the stunting and underweight category (21.3%) and the least was in the wasting only category (1.3%). Family awareness about nutrition and health seeking behavior were not found to be related to the nutritional status of children, where statistically the prevalues obtained were 0.217 and 0.173, respectively.

Conclusion: Based on the CIAF, none of the factors studied were found to have an association with malnutrition. Further research is needed by examining a wider scope of variables and providing more intensive training to survey officers to obtain more accurate data.

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INTRODUCTION

Malnutrition is the most important public health problem because it affects more than 900 million people worldwide. Undernutrition is a condition where there is not enough nutritional intake, including inadequate food intake both quantitatively and qualitatively. This is important to know because the consumption of energy-dense foods with poor nutritional quality can lead to malnutrition (Martins et al., 2011). Malnutrition

is a global problem that has an important impact on survival, the incidence of acute and chronic disease, healthy development, and the economic productivity of individuals and communities (Black et al., 2013).

Malnutrition in toddlers (under five years) is known to cause disturbances in growth and development. Malnutrition causes high mortality in children and has long-term effects on the body. Malnutrition can lead to increased susceptibility to fat accumulation, especially in the midsection, lower fat oxidation, insulin resistance in adulthood, hypertension, and dyslipidemia. Some of these effects appear to be epigenetic, meaning they are passed down from generation to generation.

Malnutrition in children has been associated with poor mental development and school performance as well as behavioral disorders. However, there is still debate in the literature as to whether some of these effects are permanent or reversible. Stunting children who have experienced growth spurts have verbal vocabulary and quantitative test scores that are no different from those of children who are not stunted.

Children admitted to the hospital before the age of six years recovered from stunting and had normal body composition, bone mineral density, insulin production, and sensitivity (Martins et al., 2011). A chart made by the United Nations Children's Fund (UNICEF) states that the basic and underlying causes of malnutrition are environmental, economic, and sociopolitical factors, with poverty playing the most important role. These factors lead to household food insecurity, inadequate maternal and child care, an unhealthy household environment, and inadequate health services (Black et al., 2008).

Based on Riskesdas data in 2018, the prevalence of stunting under five in Indonesia shows 30.8% or around 7 million children under five suffer from stunting. This situation is greater than the maximum stunting prevalence limit set by WHO, which is 20%. The prevalence of stunting under five in the province of the Bangka Belitung Islands was 23.37%, and this decreased compared to the results of Riskesdas in 2013, which were 28.66%. As for wasting toddlers (thin), based on the results of Riskesdas 2013, the province of the Bangka Belitung Islands is in the serious category, which is 10–14% based on WHO, 2010. However, based on Riskesdas 2018, the prevalence has decreased to 9.87% (Badan Penelitian dan Pengembangan Kesehatan, 2019).

The Bangka Belitung Islands Province has 8 districts. West Bangka Regency has the highest cases of malnutrition compared to other regions. In 2020, West Bangka has 15.12% undernourished toddlers (weight/age), 16.96% short toddlers (height/age), and 5.69% thin under-fives (weight/height). These figures are quite high compared to the coverage of malnutrition in the province, which is only 6% undernourished, 7.46% short, and 2.75% thin (Dinas Kesehatan Provinsi Kepulauan Bangka Belitung, 2020).

The Composite Index of Anthropometric Failure (CIAF) is an anthropometric index that combines the three indices of weight/age, height/age, and weight/height to determine the nutritional status of toddlers. The category of nutritional status based on the CIAF is divided into growth failure and normal. Growth failure is a combination of six categories, namely undernourished, short, thin, short and thin, undernourished and underweight, and undernourished, short, and thin. Toddlers are declared normal if they are not malnourished, not short, and not thin. Undernourished, short, and underweight were determined based on a Z score < -2 SD, while normal toddlers if Z score ≥ -2 SD (Rahmadini, Sudiarti, & Utari, 2013).

It is widely known that malnutrition can cause morbidity and mortality. Conventional tools are often used to predict this risk. The classification of nutritional disorders using nutrition that shows specificity as well as a combination of growth failure may be able to predict the risk experienced better than conventional methods (Preedy, 2012). West Bangka Regency in particular and the Province of the Bangka Belitung Islands in general have not classified malnutrition that occurs based on CIAF. The aim of this study was to determine the factors associated with malnutrition based on the CIAF.

MATERIALS AND METHOD

This research is a descriptive quantitative study with a cross-sectional design that was conducted for 10 (ten) months in West Bangka Regency, Bangka Belitung Islands Province, in 2022. The population in this study were all families with toddlers from the ages of 6 to 59 months in West Bangka Regency. The sample of 155 toddlers was taken using the multistage random sampling technique.

The sample was selected based on the inclusion criteria, namely, being willing to become research respondents. Respondents will be excluded if it turns out that the toddler was born prematurely, has a history of Low Birth Weight (LBW) and has congenital abnormalities. Sampling was carried out in two stages: first selecting Puskesmas in West Bangka Regency, then selecting Posyandu and PAUD in the working area of the Puskesmas.

The instruments used include questionnaires about the characteristics of parents, family economy, family awareness about nutrition, and health seeking behavior. The tools to detect malnutrition are a calibrated digital stature meter and weight scales. The data was analyzed through Chi Square, and Mann-Whitney is used as an alternative if the data found does not meet the requirements. This research has passed the ethical review by the Health Research Ethics Commission of the Poltekkes Kemenkes Pangkalpinang with the number 01/EC/KEPK-PKP/V/2022.

RESULTS

Based on table 1, it was found that the rate of growth failure in children from all categories was 75 children (48.4%), or nearly half of the total number of respondents. Meanwhile, 80 children (51.6%) had normal growth. The most growth failure was in the stunting and underweight categories, namely 33 children (21.3%), while the least was in the wasting only category, namely 2 children (1.3%).

Table 1. Prevalence of malnutrition based on CIAF in West Bangka

| Group | CIAF category | Frequency (%) |
|--------------|-----------------------------------|------------------|
| I | Normal | 80 (51,6) |
| II | Wasting only | 2 (1,3) |
| III | Stunting only | 19 (12,3) |
| IV | Underweight | 5 (3,2) |
| V | Stunting and Underweight | 33 (21,3) |
| VI | Wasting and Underweight | 5 (3,2) |
| VII | Wasting, Stunting and Underweight | 11 (7,1) |
| Total | | 155 (100) |

CIAF (II + III + IV + V + VI + VII) = 48,4%.

Table 2. Characteristics of respondents based on growth failure

| Variable | Growth Failure Frequency (%) n=75 | Normal Frequency (%) n=80 | Total Mean ± SD Frequency (%) n=155 |
|---------------------------|--|--|--|
| Sex of Child | | | |
| Female | 27 (40,9) | 39 (59,1) | 66 (100) |
| Male | 48 (53,9) | 41 (46,1) | 89 (100) |
| Child Age (months) | | | |
| | | | 35,49 ± 14,794 |
| 6 – 11 | 2 (16,7) | 10 (83,3) | 12 (100) |
| 12 – 23 | 16 (64) | 9 (36) | 25 (100) |
| 24 – 35 | 13 (43,3) | 17 (56,7) | 30 (100) |
| 35 – 47 | 26 (56,5) | 20 (43,5) | 46 (100) |
| 48 – 59 | 18 (42,9) | 24 (57,1) | 42 (100) |
| Mother age (years) | | | |
| | | | 28,35 ± 5,781 |
| < 20 | 2 (66,7) | 1 (33,3) | 3 (100) |
| 20 – 35 | 66 (48,9) | 69 (51,1) | 135 (100) |
| > 35 | 7 (41,2) | 10 (58,8) | 17 (100) |
| Mother's education | | | |
| None education | 7 (63,6) | 4 (36,4) | 11 (100) |
| Basic education | 50 (50) | 50 (50) | 100 (100) |
| Advanced Education | 18 (40,9) | 26 (59,1) | 44 (100) |
| Household Income | | | |
| < Rp.3.264.884 | 41 (50) | 41 (50) | 82 (100) |
| ≥ Rp.3.264.884 | 34 (46,6) | 39 (53,4) | 73 (100) |

Based on table 2, it can be seen the characteristics of the respondents based on their growth failure. The group of girls had fewer cases of growth failure (40.9%) than boys (53.9%). The group of children with the highest cases of growth failure was in the age range of 12 to 23 months old (64%). But in total, the growth failure category is mostly 35-47 months old.

Mothers who were in the age category less than 20 years old had children with higher cases of growth failure (66.7%) than mothers in other age groups (20 to 35 years old, and over 35 years old) where cases of growth failure were fewer in same age range group. Children whose mothers had no education experienced more cases of growth failure (63.6%) compared to the group of mothers who had basic and advanced education. The last two groups have more children who could grow normally.

Family income has the same amount for groups of families who have an income of less than 3,264,884 rupiah. However, in the group of families with higher incomes, more children were able to grow normally (53.4%) than those who have growth failure (46.6%).

Table 3. Relationship of family awareness about nutrition and health seeking behavior with nutritional status

| Variable | Nutritional Status | | | | | | | p |
|---|--------------------|--------------|---------------|--------------|-----------------------|----------------------|--------------------------------|--------|
| | Normal | Wasting Only | Stunting Only | Under weight | Stunting, Underweight | Wasting, Underweight | Wasting, Stunting, Underweight | |
| Family awareness about nutrition | | | | | | | | 0,217* |
| Yes | 30 (46,2%) | 0 | 11 (16,9%) | 1 (1,5%) | 17 (26,2%) | 2 (3,1%) | 4 (6,2%) | |
| No | 50 (55,6%) | 2 (2,2%) | 8 (8,9%) | 4 (4,4%) | 16 (17,8%) | 3 (3,3%) | 7 (7,8%) | |
| Health seeking behaviour | | | | | | | | 0,173* |
| Yes | 5 (35,7%) | 0 | 3 (21,4%) | 0 | 5 (35,7%) | 1 (7,1%) | 0 | |
| No | 75 (53,2%) | 2 (1,4%) | 16 (11,3%) | 5 (3,5%) | 28 (19,9%) | 4 (2,8%) | 11 (7,8%) | |

*Mann-Whitney

Based on the results in Table 3, it can be seen that the group of families with less awareness of nutrition has the most complex combination of growth failure (wasting, stunting, and underweight) at 6.2% compared to the opposite group at 7.8%. Even so, family awareness about nutrition was statistically found to have a non-significant effect on the incidence of malnutrition experienced by children ($p = 0.217$). In table 3, it can also be seen that data on health seeking behavior in families shows that families implementing health seeking behavior do not have complex cases of growth failure (wasting, stunting, and underweight) compared to the opposite group (11%). However, statistically, health-seeking behavior is not a factor that has a relationship with the nutritional status of children ($p = 0.173$).

DISCUSSION

The issue of malnutrition by assessing it based on the CIAF by combining various growth failures that occur has not been widely carried out in Indonesia. Generally, the assessment of malnutrition is only based on one indicator, including stunting only, underweight only, or wasting only. This type of assessment cannot show actual cases of malnutrition. This was proven in the results of this study (table 1), where of all cases of growth failure (48.4%), the most were in the stunting and underweight combination group (21.3%), while the least growth failure was in the wasting only group (1.3%). These data are similar to those obtained by a study conducted in Ethiopia, where the CIAF malnutrition rate was 48.5% (Endris, Asefa, & Dube, 2017).

Stunting and underweight illustrate that a child experiences stunting and underweight at the same time. Children with a combination of both growth failure have height and weight that are not appropriate for their age. Stunting and being underweight but not wasting are not linked to developmental delays in children. Other factors that were found to have an effect were the mother's occupation and the pattern of administration, which were predictors of the risk of developmental delays in children (Oumer et al., 2022).

The number of growth failures discovered in this study (table 1) demonstrates that malnutrition remains an unresolved issue in West Bengal. West Bangka has been the locus of stunting since 2018 (Fitrajaya, 2021). Various efforts have been made by the local government, including forming a Team for the Acceleration of Stunting

Reduction, which is included in the Regional Medium-Term Development Plan (Angga, 2022). Despite the handling from various local, provincial, and even national governments as well as the various programs that have been implemented, West Bangka is still one of the areas with the highest prevalence of stunting in Bangka Belitung (10.3%) (Ditjen Bangda, 2022).

This is of particular concern, and it is necessary to evaluate the handling of the stunting that has been carried out. The government must also focus on overcoming stunting, not only by intervening in food adequacy but also by looking for the causes of the malnutrition problem that occurs. Thus, in addition to the food that is carried out being more specific to the causes experienced, it can also prevent malnutrition that has not yet occurred.

The results of this study show that many children with stunting are also underweight. This, of course, has not been seen from the data released by the official website for calculating nutritional disorders from official government institutions. Wasting and stunting are the most common indicators for assessing a child's nutritional status, designing programs, and assessing the impact of malnutrition. Stunting is considered to reflect chronic nutritional disorders or long-term conditions of malnutrition in children, while wasting is usually used to reflect acute situations related to illness or a lack of food intake.

Stunting is the most common type of malnutrition in Indonesia. However, that does not mean that wasting and underweight can be ruled out. Often, one nutritional disorder is followed by another. As a result, the effects of malnutrition experienced by children will also be more severe than if they experienced only one type of malnutrition (stunting only, wasting only, or being underweight only).

Children with malnutrition can affect their academic performance at school. Stunting was especially found to have a significant and prolonged negative effect on language, mathematics, and average grades (Haywood & Pienaar, 2021). Stunting and underweight may be affected by the cumulative effect of intermittent wasting. Children with multiple malnutrition are reported to have higher mortality compared to children who only have one type of malnutrition (McDonald et al., 2013).

Malnutrition occurred more frequently in the group of boys (53.9%) in this study. These results are consistent with previous studies conducted in India and sub-Saharan Africa where boys were found to be more at risk of experiencing malnutrition (Porwal et al., 2021). However, other studies suggest that gender and age are interrelated. The sex previously at risk of experiencing malnutrition may change with age (Garenne et al., 2021). Boys are more at risk of experiencing malnutrition in the first year of life, but girls are more at risk in the following years (Adair & Guilkey, 1997).

Mother's age plays an important role in the first year of children's life (Moiseeva Karina, Ivanov Dimitry, Alekseeva Anna, Kharbediya Shalva, & Berezkina Elena, 2020). This study found that mothers in the age category of less than 20 years old had more children with growth failure than normal ones. Whereas in other age ranges (20 to 35 years and over 35 years old), there are more children who can grow normally.

This is in accordance with research conducted in Ghana, where teenage mothers have a three times higher risk of having children with cases of malnutrition. This is because it is more difficult for young mothers to meet the nutritional adequacy of their children and to meet the needs of clean water and good sanitation. Teenage mothers are also considered psychologically unprepared for the parenting process that occurs (Wemakor, Garti, Azongo, Garti, & Atosona, 2018).

Mothers who have no education have more children with growth failure compared to mothers who have basic and advanced education. This is consistent with previous research conducted in Indonesia, where stunting and underweight were found to be associated with mothers who had never received formal education (Rachmi, Agho, Li, & Baur, 2016). Mothers who have education will have good knowledge. A mother with good knowledge will raise children well. One way to care for children is to ensure that their nutrition is fulfilled properly.

Families who have an income above the minimum standard wage in Bangka Belitung (above Rp. 3,264,884) have fewer cases of growth failure than normal. This is in accordance with research conducted in India, where cases of malnutrition, especially stunting, often occur in areas where residents have low incomes (Singh, Srivastava, & Chauhan, 2020). To have a good nutritional status, nutrition must be fulfilled properly. Fulfillment of nutrition requires financial support to buy nutrients. Families with low incomes will not be able to meet the nutritional needs of their family members.

Based on table 3, it can be seen that there is no statistical relationship between nutritional status with family awareness about nutrition and health seeking behavior. In the family awareness about nutrition variable, more respondents had normal nutritional status (46.2%), and the highest nutritional disorders experienced were stunting and underweight (26.2%). Family awareness about nutrition or what is often called a family-aware nutrition, is the government's effort in overcoming nutritional problems. In this study, data obtained that statistically levels of nutritional problem in children under five.

Families that are awareness of their nutritional condition are able to recognize, prevent, and overcome nutritional problems that occur in their family members. The indicators used are regular weighing, exclusive breastfeeding, food menus, use of iodized salt, and nutritional supplements consumed. In this study, there was no statistical relationship between family awareness of nutrition and the nutritional status of children under five ($p = 0.217$).

This is contrary to the research conducted by Wahyuni and Febry, (2019), which showed that there was a relationship between the nutritional status of toddlers based on the CIAF and nutrition-aware family (Wahyuni & Febry, 2019). This may be due to other factors that have not been studied by researchers that play an important role in influencing the nutritional status of children under five. This study also found that health seeking behavior did not have a significant effect on determining the nutritional status of children under five ($p = 0.173$), although in general it can be seen in Table 3 that most of the respondents who did not have health seeking behavior had more nutritional disorders than families who did.

The family has an important influence on the nutritional status of the children in it. Children who have malnourished mothers, uneducated parents, poor household sanitation, and live in rural areas are more at risk of experiencing malnutrition than children with the opposite condition (Fenta, Zewotir, & Muluneh, 2021). The results of the study contradict research conducted in Bangladesh, where socio-economic variables such as household economic status, parental education, maternal health behavior, sanitation, fertility, and height have a role in stunting prevention (Huda, Hayes, El Arifeen, & Dibley, 2018).

The results of this study that are different from previous studies may be due to other variables that affect the nutritional status of children under age five but were not examined by the researchers. It is possible that the data collected is assessed inappropriately by the survey officer, which can also be one of the factors that occur due

to human error. Factors that are wider in scope and holding special activities to make the understanding of survey officers more comprehensive are the next steps that researchers will take for future activities.

CONCLUSION

None of the factors studied were found to have an association with malnutrition based on the CIAF. Further research is needed by examining a wider scope of variables and providing more intensive training to survey officers in order to obtain more accurate data. Thus, variables that affect the occurrence of malnutrition based on CIAF in toddlers can be found.

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Original Research

Pregnancy Preparation Analysis And Determinant Factors In Pregnant Women

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ABSTRACT

Background: *Pregnancy preparation is still not the focus of attention for pregnant women. Good pregnancy preparation is supported by three factors, namely social demographics, pregnancy characteristics, and a history of depression. This study aims to analyze pregnancy preparation and its determinant factors in pregnant women in Medan City, North Sumatra Province.*

Methods: *This research is quantitative correlational analytic research with a cross-sectional approach. The population in this study was all pregnant women at health centers in Medan City, North Sumatra. The sampling technique used simple random sampling, with a total of 375 pregnant women. The data were analyzed through the Chi-Square test.*

Results: *There was a significant relationship between age ($p = 0.005$), education ($p = 0.001$), economic status ($p = 0.012$), pregnancy status ($p = 0.000$), and history of depression ($p = 0.002$) with preparation for pregnancy in pregnant women.*

Conclusion: *The existence of socio-demographic relationships, pregnancy characteristics, and a history of depression with pregnancy preparation in pregnant women provide an overview for health workers to assist in pregnancy preparation during preconception.*

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INTRODUCTION

Pregnancy demands the mother's readiness to behave healthily in keeping the baby safe. According to Bagherzadeh et al., (2021), mothers who are ready to undergo pregnancy feel responsible for finding a healthy lifestyle so that the fetus is in good condition. Bauer et al., (2020), pregnant women with a healthy lifestyle support a healthy uterus for the fetus is developing.

In addition, the readiness of pregnant women can stabilize their emotions and reduce postpartum anxiety for the safety of their babies (Hijazi et al., 2021). In the study of Naze, (2017), the readiness of the mother during pregnancy can contribute to the development of a healthy fetus. However, some pregnancies have risks or complications for the mother and fetus.

A problematic pregnancy hurts the mother and fetus. According to Mihretie & Habitamu, (2022) the prevalence of pregnancy disorders that cause fatal conditions for the fetus is 26.7% and that for the mother is 12.3%. In the study of Poudel et al., (2021), mothers who experience hypertension during pregnancy have the opportunity to give birth to babies with low body weight. Tadese et al., (2022) identified 28.3% adverse pregnancy and obstetric complications in the form of prolonged labor (7.4%), retained placenta (5.3%), hypertension during pregnancy (2.4%), stillbirth (10%), malpresentation (3%) and prematurity (2.3%). Pregnancy disorders can harm the mother and fetus. So, mothers need to prepare well for pregnancy.

Preparation for pregnancy provides benefits for the safety of the mother and fetus. According to Hall et al., (2018), prepared pregnancies contribute to a reduction in stillbirths and a reduced risk of postnatal depression in mothers. Yargawa et al., (2021), mothers who are preparing for pregnancy will visit 4 (four) antenatal care visits on time.

This supports the mother to consume the best nutrition for the health of the fetus. Flynn, Pryke, Wadhera, Poston, & White (2021), mothers who have optimal preparation for pregnancy can prevent the risk of complications in pregnancy. The mother's desire to prepare for pregnancy requires a special assessment. The London Measure of Unplanned Pregnancy (LMUP) is a valid and reliable measurement tool for analyzing pregnancy preparation (Das et al., 2021).

According to Almaghaslah, Rochat, & Farhat, (2017) LMUP identifies the behavior and attitudes of mothers in preparing for pregnancy. Borges et al., (2016), LMUP can also assess preparation for pregnancy in pregnant women in trimesters 1 to 3, postpartum women, and women with a history of abortion (spontaneous or induced). Preparation for pregnancy is still not the focus of attention for pregnant women.

The study by Olani et al., (2022), identified pregnant women who were not well prepared for their pregnancy (5.9%). According to Solís-Cordero et al., (2021), unprepared pregnancies (17.6%) and the frequency of preparation for pregnancy are still low (24.8%). According to Bukenya et al. (2019), preparation for pregnancy is low, with only 11.0% of pregnant women preparing for their pregnancy. Preparation for pregnancy is very important for both mother and baby, so the readiness of pregnant women is related to certain factors.

Preparation for a good pregnancy is very dependent on the determinant factors. According to Mwase-Musicha et al., (2022), pregnant women can prepare well for pregnancy if it is supported by three factors, namely, social demographics, pregnancy characteristics, and a history of depression before pregnancy. Nascimento, Borges, & Fujimor, (2019), socio-demographics of mothers who support maximum pregnancy preparation related to age, education, economic status, and how many children are pregnant. Bind et al., (2021) found that a history of depression experienced by the mother before pregnancy can increase her unresponsiveness in preparing for pregnancy and the birth of a baby.

A preliminary study conducted on March 8 in Medan City, North Sumatra Province, through interviews with 15 pregnant women found that 5 women always used contraception after giving birth to their first child, 4 women felt that their pregnancy was not at the right time, 2 women had no desire to get pregnant, 4 mothers said they did not know how to prepare for healthy conditions during pregnancy, and 3 mothers complained that they did not have enough money to meet the needs of their babies later. This shows that the mother has not optimally prepared for pregnancy. However, mothers have an active role in preparing for pregnancy.

Preparation for pregnancy is crucial for optimal fetal development. However, there are still many mothers who do not prepare for their pregnancy properly. Mothers' desire to prepare for pregnancy is related to socio-demographic factors, pregnancy characteristics, and a history of depression. Therefore, this study aims to analyze pregnancy preparation and determinant factors in pregnant women in Medan City, North Sumatra Province.

MATERIALS AND METHOD

This research is a type of quantitative correlational analytic research with a cross-sectional approach. The population in this study were all pregnant women who were recorded in 5 health centers with the type of care (Tuntungan Health Center, Kedai Durian Health Center, Bromo Health Center, Medan Denai Health Center, and South Area Health Center Medan) located in Medan City, North Sumatra in 2021, totaling 5970 pregnant women. The sampling technique used was simple random sampling, with the number of samples calculated using the Slovin formula. In this study, were 375 pregnant women.

The pregnancy preparation assessment instrument was adopted by Lang et al., (2019), known as the London Measure of Unplanned Pregnancy (LMUP), which consists of six question items with a score of 0, 1, and 2. All answers are accumulated in 3 categories, including no preparation (0–3), some preparation (4–9), and preparation (10–12). As for the determinants of pregnancy preparation, there are three instruments, including social demographics, pregnancy characteristics, and a history of depression before pregnancy (Mwase-Musicha et al., 2022).

Researchers conducted an instrument test on 30 pregnant women for 2 (two) weeks from April 7 to April 21, 2022, at the Teladan Health Center. The instrument test that the researcher conducted was the validity and reliability test of the research questionnaire using the Pearson Product Moment (r) correlation test. The results of the SPSS output validity for the pregnancy preparation instrument showed that all of the question items were valid, with the r value of each question item being 0.361, and the reliability results of the pregnancy preparation variable obtained a 0.781 greater than the 5% Cronbach alpha (α) value of 0.60, so measuring preparation for pregnancy is considered reliable.

So, the researcher used all question items from the pregnancy preparation variable when conducting research in 5 health centers with the type of treatment (Tuntungan Health Center, Kedai Durian Health Center, Bromo Health Center, Medan Denai Health Center, and South Area Health Center) Medan City, North Sumatra. The research data were analyzed univariately to identify socio-demographic data, pregnancy characteristics, a history of depression before pregnancy, and preparation for pregnancy. Next, a bivariate analysis was performed using the Chi-Square test to prove the relationship between the independent variables (social demographics, pregnancy characteristics, and history of depression before pregnancy) with the dependent variable (pregnancy preparation).

Researchers apply ethical principles in conducting this research, including beneficence, respect for human dignity, and justice. The researcher conducted an ethical test of the "pregnancy preparation" research instrument in the health research ethics committee section of Dr. Djamil Hospital Padang with the number LB.02.02/5.4/237/2022 and declared it "passed the ethics review".

RESULTS

The results of research conducted on 375 pregnant women in Medan City, North Sumatra are described as follows:

Table 1. Frequency Distribution of Determinant Factors from Pregnancy Preparation and Pregnancy Preparation

| Independent Variable | Category | f | % |
|--|------------------|----------|----------|
| Social Demographics | | | |
| Age | Early adulthood | 238 | 63.5 |
| | Middle adult | 137 | 36.5 |
| Education | Primary school | - | - |
| | Secondary school | 251 | 66.9 |
| | College | 124 | 33.1 |
| Economic status | Low | 167 | 44.5 |
| | Intermediate | 208 | 55.5 |
| | Top | - | - |
| Obstetric characteristics | | | |
| Pregnancy status | Primigravida | 269 | 71.7 |
| | Multigravida | 106 | 28.3 |
| History of depression before pregnancy | Never | - | - |
| | Seldom | 189 | 50.4 |
| | Often | 186 | 49.6 |
| Preparation for pregnancy | No preparation | 194 | 51.7 |
| | Some preparation | - | - |
| | Prepared | 181 | 48.3 |

Table 1 shows that most pregnant women with early adulthood (63.5%), most pregnant women with high school education (66.9%), most pregnant women with middle economic status (55.5%), most pregnant women with pregnancy status are primigravida(71.7%), most pregnant women have a history of depression before pregnancy in the rare category (50.4%) and the majority of pregnant women stated that they did not prepare for pregnancy in Medan City, North Sumatra.

Table 2. Factors Related to Pregnancy Preparation

| Variable | Preparation for pregnancy | | | | Total | | P-value |
|-------------------------|----------------------------------|----------|-----------------|----------|--------------|----------|----------------|
| | No preparation | | Prepared | | f | % | |
| | f | % | f | % | | | |
| Age | | | | | | | |
| Early adulthood | 141 | 59.2 | 97 | 40.8 | 238 | 100 | 0.005 |
| Middle adult | 53 | 38.7 | 84 | 61.3 | 137 | 100 | |
| Education | | | | | | | |
| Secondary school | 171 | 68.1 | 80 | 31.9 | 251 | 100 | 0.001 |
| College | 23 | 18.5 | 101 | 81.5 | 124 | 100 | |
| Economics status | | | | | | | |
| Low | 98 | 58.7 | 69 | 41.3 | 167 | 100 | 0.012 |
| Intermediate | 96 | 46.1 | 112 | 53.9 | 208 | 100 | |
| Pregnancy status | | | | | | | |
| Primigravida | 120 | 44.6 | 14932 | 55.430.2 | 269106 | 100 | 0.000 |

| Variable | Preparation for pregnancy | | | | Total | | P-value |
|------------------------------|---------------------------|------|----------|------|-------|-----|---------|
| | No preparation | | Prepared | | f | % | |
| | f | % | f | % | | | |
| Multigravida | 74 | 69.8 | | | 100 | | |
| History of depression | | | | | | | |
| Seldom | 86 | 45.5 | 103 | 54.5 | 189 | 100 | 0.002 |
| Often | 108 | 58.1 | 78 | 41.9 | 186 | 100 | |

Table 2 identifies the results of statistical tests using Chi-Square on all determinant factors. It was found that there was a significant relationship between age, education, economic status, pregnancy status, and history of depression with preparation for pregnancy in pregnant women in Medan City, North Sumatra.

DISCUSSION

Determinant Factors from Pregnancy Preparation and Pregnancy Preparation

The results of the study in table 1 show that most pregnant women with early adulthood, most pregnant women with high school education, most pregnant women with middle economic status, most pregnant women with pregnancy status are primigravida, most pregnant women have a history of depression before pregnancy in the rare category and the majority of pregnant women stated that they did not prepare for pregnancy in Medan City, North Sumatra. This is following a study by Duko, Ayano, & Bedaso, (2019) which identified the socio-economic and demographic characteristics of pregnant women in early adulthood (53.9%), including having a high school education (34.7%), low family income (68.1%), and being less prepared for pregnancy (32.5%). Pregnant women rarely have a history of depression. Moura, Pedrão, Souza, & Boaventura (2015), found that 17% of pregnant women experienced signs indicating depression associated with low family income.

According to the researcher's analysis, social demographic identification, pregnancy characteristics, and a history of depression with pregnancy preparation in pregnant women can assist health workers in providing support for pregnancy preparation. Where pregnant women in early adulthood will easily understand the information conveyed by health workers and follow antenatal care properly. Gross, Alba, Glass, Schellenberg, & Obrist, (2012) found that the age of pregnant women identified the majority of early adulthood as having started antenatal care.

According to Klodian Dhana et al. (2018), the average pregnant woman is in the early adult category at delivery. Magnus et al. (2020) report that women are known to have experienced their first pregnancy in early adulthood. So, health workers can take advantage of the results of this research in choosing the right method to provide assistance for pregnancy preparation and improve the health of mothers and children.

Factors Related to Pregnancy Preparation

The results of the study in Table 2 show that there is a significant relationship between age, education, economic status, pregnancy status, and history of depression with pregnancy preparation in pregnant women in Medan City, North Sumatra, with each p-value (age p-value = 0.005; education p-value = 0.001; economic status p-value = 0.012; pregnancy status p-value = 0.000; and history of depression p-value = 0.002).

This is supported by studies by Hall et al., (2016), which found that there is a relationship between pregnancy preparation and maternal and paternal age and education, marital status, number of living children, birth spacing, socioeconomic status, intimate partner violence, and previous depression. In addition, women who have experienced depression, abuse in the past year, or sexual violence are at a higher risk of an unprepared pregnancy.

According to the researcher's analysis, the determinant factors (age, education, economic status, pregnancy status, and history of depression) are related to preparation for pregnancy. When viewed from the age factor, most of the respondents include early adulthood. Individuals in their early adulthood are still burdened by unaddressed emotional conditions, which is consistent with the findings of Habib et al., (2017) in Pakistan, who discovered a high prevalence of unwanted pregnancies (38.2%), implying that pregnant women do not prepare for pregnancy optimally.

Educational factor, most of the respondents' education was at the high school level. Individuals who complete high school receive only reproductive health socialization but no information about pregnancy knowledge. This has an impact on the respondent's desire to prepare for a healthy pregnancy.

The study by de Oliveira Rodrigues et al., (2022) showed that most pregnant women did not prepare for pregnancy (65%), which was related to the mother's lack of knowledge. According to Wardani and Tridiyawati, (2022), knowledge aids pregnant women's psychological readiness in properly preparing for a pregnancy. Sampoera, Wardani, & Hapsari, (2020) at the educational level, support the mother's knowledge in preparing for pregnancy through prenatal check-ups.

Economic status factors, most of the respondents with low economic status. This condition determines the preparation for pregnancy, both in fulfilling nutritional needs and acquiring equipment for welcoming the baby. According to Yelkumo, Suara, Boakye-Yiadom, & Aryee, (2019), economic status shapes the behavior of mothers to prepare themselves adequately for a healthy pregnancy, birth, and emergency service delivery. Faisal-Cury, (2015) pregnant women with financial adequacy support preparation for pregnancy in their obstetric examination. According to Yadegari et al., (2017), mothers can prepare for healthy pregnancies if their economic situation allows them to meet their food needs.

Regarding the pregnancy status factor, most of the respondents were primigravida. This situation demonstrates that respondents who have never been pregnant are unaware of the things that must be prepared during pregnancy. According to Ranatunga & Jayaratne, (2020) mothers who do not prepare for pregnancy include unmarried women, primigravida, and those who lack knowledge about contraception. According to Abita and Shikur, (2020) primigravida mothers who have complete antenatal visits can prepare for pregnancy well and are not concerned about the delivery. So, primigravida mothers don't prepare for a pregnancy properly because they don't know the information.

In terms of the history of depression, most of the respondents had rarely experienced depression before pregnancy. This shows that the respondent experiences a burden on his mind that interferes with his focus of attention in preparing for pregnancy. Shakeel et al., (2015), a history of depression often occurs three months before pregnancy, which has an impact on maternal and fetal complications.

This condition has an impact on the mother in preparation for pregnancy to maintain healthy fetal development. According to Belay, Moges, Hiksa, Arado, &

Liben, (2018) mothers who experienced depression before pregnancy can experience recurrent depression, so they are unable to prepare for a healthy pregnancy.

CONCLUSION

The conclusion from the results of this study was that most pregnant women were in early adulthood, most pregnant women with high school education, most pregnant women with middle economic status, most pregnant women with pregnancy status were primigravida, most pregnant women had a history of depression. Before pregnancy in the rare category, and most of the pregnant women stated that they did not prepare for pregnancy in the city of Medan, North Sumatra. While the results of the bivariate analysis showed that there was a significant relationship between age, education, economic status, pregnancy status, and history of depression with preparation for pregnancy in pregnant women in Medan City, North Sumatra.

Based on the results of this study, it is recommended for health center workers to be able to cooperate with village health cadres in socializing pregnancy preparation for pregnant women and prospective brides during preconception. So that mothers have the readiness both physically, psychologically, financially, socially, interpersonally, intellectually and skills to undergo pregnancy. In addition, it is hoped that future researchers will be able to analyze models of pregnancy preparation assistance for pregnant women and their supporting factors.

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