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Descriptive Study: Overview of Diastasis Recti Abdominis Incidence in Postpartum PKK Mothers in Jimbaran Village

Gusti Ayu Made Intan Rama Apsari[1*], Ni Luh Nopi Andayani[2], M. Widnyana[3], Anak Agung Gede Angga Puspa Negara[4]

[1]Bachelor and Profession of Physiotherapy Study Porgram, Faculty of Medicine, Udayana University, Denpasar, Bali
[2,3,4]Department of Physiotherapy, Faculty of Medicine, Udayana University, Denpasar, Bali
*Corresponding author: gamintanramaapsari@gmail.com

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ABSTRACT

Introduction: Pregnancy is a significant event in a woman's life, leading to both physical and psychological changes. One physical change is the stretching of abdominal muscles due to the increasing volume of the uterus. This stretching along the body's midline is known as diastasis recti abdominis (DRA). DRA often occurs during the postpartum period. Untreated or unresolved DRA can lead to various health problems, such as lower back pain and postural issues. This study aims to provide an overview of DRA incidence in postpartum PKK mothers in Jimbaran Village.
Methods: This research used a descriptive observational method with a cross-sectional approach and purposive sampling technique. The sample size was 111 subjects who met the inclusion and exclusion criteria. Data analysis was performed using univariate analysis.
Results: The participating samples were postpartum PKK mothers in Jimbaran Village aged 20-40 years, mostly with a normal BMI and primarily primiparous. Fewer DRA cases were found in this study. The highest incidence of DRA was observed in the 36-40 years age group, multiparous women, and those with an obese BMI category.
Conclusion: This study concluded that the incidence of Diastasis Recti Abdominis, particularly mild DRA, was found in 13 out of 111 respondents (11.7%). The study underscores the importance of weight management and postpartum health monitoring to reduce the risk of DRA. Further research is needed to explore other risk factors and underlying mechanisms of DRA occurrence.

Keywords: diastasis recti abdominis (DRA), postpartum mothers, maternal age, body mass index (BNI), obesity

INTRODUCTION

Women are beings endowed with various advantages. According to the Indonesian dictionary, women are defined as humans who can experience menstruation, pregnancy, childbirth, and breastfeeding. Women face various health issues across different age groups, particularly during pregnancy and the postpartum period. Pregnancy induces numerous physical changes in a woman's body, notably within the musculoskeletal system. One significant change is the stretching of the abdominal wall muscles due to the increasing uterus volume, leading to a decrease in abdominal muscle tone. As the uterus enlarges to accommodate the growing fetus, it affects the shape of the abdomen and the spine's position, increasing the distance between muscle attachments. This stretching functionally impacts muscle strength, especially the rectus abdominis muscle.[1] This issue persists into the postpartum period.

The postpartum period is the time from the delivery of the placenta until the reproductive organs and the woman's body return to their pre-pregnancy state. This period generally lasts 6-8 weeks. In postpartum mothers, the abdominal wall experiences prolonged distension due to pregnancy, resulting in the abdominal wall becoming soft and lax. Restoring the normal structure can take several weeks to months. If the muscles remain atonic, it can lead to a noticeable diastasis recti abdominis.[2]

Diastasis recti abdominis (DRA) is a condition characterized by the separation of the two rectus abdominis muscles along the linea alba. During pregnancy, the increasing volume of the uterus causes changes in the shape of the abdomen and the position of the lumbar spine, which can reduce muscle strength, especially in the rectus abdominis muscles. This can lead to stretching or flaccidity in the connective tissue of the linea alba. If DRA does not heal after childbirth, it can result in various health problems such as lower back pain, pelvic instability, urinary incontinence, and even herniation.[3]

Several international studies have identified the prevalence of DRA in relation to various risk factors. According to a study by Ulfah Mariah in 2014, DRA was found in 100% of pregnant women. Walton et al., 2015, found that out of 100 women examined, 68% of postpartum women experienced widening of the linea alba and stretching of the rectus abdominis muscles.[4] According to Sperstad et al. (2016), the prevalence of DRA varies at different stages of pregnancy. At 21 weeks of pregnancy, the prevalence is 33.1%, at 6 weeks postpartum it is 60%, at 6 months postpartum it is

45.4%, and at 12 months postpartum it is 32.6%.[5] A study by Demartini in 2016 showed that the prevalence of DRA was 31.5% among postpartum women, with 31.5% being primiparous and 68.5% being multiparous.[6]

In Indonesia, particularly in Bali, there is still a lack of research on the prevalence of diastasis recti abdominis, including in Jimbaran Village, which is part of South Kuta District and has the highest female population. According to the clean consolidation data for the second semester of 2021 from the Ministry of Home Affairs, as reported by BPS Badung Regency in 2022, Jimbaran is one of the areas in South Kuta District with the largest female population, totaling 21,179 people. Consequently, there are many community organizations followed by women, such as PKK. This underscores the need for a study on the incidence of diastasis recti abdominis among postpartum PKK mothers in Jimbaran Village to provide knowledge and support data for future research. This study aims to describe the incidence of diastasis recti abdominis in postpartum PKK mothers in Jimbaran Village and identify factors that may contribute to the occurrence of DRA. The study is descriptive and exploratory, with no initial hypothesis.

METHODS

This study employed a descriptive observational method with a cross-sectional approach, using purposive sampling. The research was conducted in Jimbaran Village in March 2024. Data collection took place during the posyandu (integrated health service post) sessions in each banjar (local neighborhood community) to reach the required sample. Based on sample size calculation using the Lemeshow formula \(n = \frac{{Z_{\alpha}^2 \cdot P \cdot Q}}{d^2} \), the sample size was determined to be 96.04. An additional 10% was added to account for potential dropouts, resulting in a total of 106 samples. However, 111 participants met the criteria during data collection.

Inclusion criteria included postpartum mothers who were members of the PKK community organization, aged 20-40 years, 1-12 months postpartum, and willing to participate by signing an informed consent form. **Exclusion criteria** were a history of heart disease, respiratory disorders (including excessive coughing and sneezing), history of pelvic or abdominal surgery (except cesarean section), neurological diseases, bowel or bladder trauma, diabetes, remote puerperium, complications during childbirth, and cesarean section history less than one month.

Internal risk factors for Diastasis Recti Abdominis, such as parity, maternal age, and body mass index (BMI), were the variables studied. Data on the participants' age and parity were obtained from their health records in the Mother and Child Health (KIA) book, shown during interviews or anamnesis by the research team. Age data were grouped into four categories: 20-25 years (safe pregnancy age with good tissue quality), 26-30 years (safe for pregnancy and childbirth with potential for multigravida or multipara), 31-35 years (reduced tissue elasticity requiring longer recovery post-pregnancy), and 36-40 years (higher DRA cases due to multiple pregnancies and childbirths). BMI data were categorized into normal, overweight, and obese, as overweight and obesity are high-risk factors for DRA. Parity data were categorized into primipara, multipara with two births, and multipara with three births.

Sample collection began with obtaining consent, explaining the study procedures and objectives, and filling out the informed consent form. Participants then signed the consent form and underwent interviews or anamnesis by the research team, followed by height and weight measurements. Participants were directed to the DRA examination area, where they lay down with bent knees and feet on the floor. They were instructed to lift their head and bring it towards their chest until their scapula was off the ground, causing abdominal muscle contraction. The research team palpated and measured the distance between the rectus abdominis muscles during the contraction. DRA width was measured using a caliper, a valid tool for clinical DRA screening and diagnosis.

To mitigate potential biases, the research team underwent training and followed standard procedures for data collection.[7] In a validity study conducted by Barbosa et al. in 2013, a comparison between DRA measurements using ultrasound and calipers showed that the average difference in DRA width above the umbilicus between the two instruments was less than 1 mm.[8] A study by Chiarello et al. in 2013 also supported these findings, showing that DRA width measurements above the umbilicus using calipers had similar agreement to those taken with ultrasound, with an estimated standard error of measurement (SEM) ranging from 0.01 to 0.17 cm.[9]

Data analysis in this study employed a univariate approach to depict respondent characteristics such as postpartum maternal age, body mass index, parity, and incidence of diastasis recti abdominis. This method provided a comprehensive overview of each variable separately.Furthermore, crosstabulation analysis was utilized to explore relationships between these variables and to identify patterns of diastasis recti abdominis occurrence within each variable group. Crosstabulation allowed simultaneous calculation of frequencies or proportions of diastasis recti abdominis occurrence for two or more related variables, yielding descriptive and insightful findings.[10] To prevent data loss, researchers backed up their data and meticulously stored documentation for all collected data.

This study has been reviewed and approved by the Ethics Commission of the Faculty of Medicine, Udayana University, with approval number 0878/UN14.2.2.VII.14/LT/2024. Research permission was also granted by the Head of Jimbaran Village coordinated with the Head of the Social Section of Jimbaran Village, posyandu cadres, and the heads of each neighborhood community (Banjar) within Jimbaran Village.

RESULTS

The research process began with initial observations and discussions with the heads of PKK organizations in Jimbaran Village. This was followed by the preparation of a research proposal, submission of ethical clearance to the Ethics Commission of the Faculty of Medicine, Udayana University, and obtaining permission from the Head of the Social Section and the Village Chief of Jimbaran to conduct research and data collection. Further coordination was conducted with the heads of PKK in each neighborhood community (Banjar) within Jimbaran Village.

Data collection involved gathering postpartum PKK mothers at each community hall (balai banjar), followed by explaining the research objectives and procedures to participants. Informed consent procedures were explained, and consent was obtained before proceeding with interviews or anamnesis, height and weight measurements, and diastasis

recti abdominis (DRA) measurements. All collected data were carefully recorded. Subsequently, the gathered data were analyzed starting with univariate analysis to assess sample characteristics, followed by crosstabulation analysis to understand the incidence of DRA across the studied variables. The next step involved compiling the research report.

In this study, variables known to contribute to the occurrence of DRA—postpartum maternal age, body mass index (BMI), and parity—were investigated among 111 samples. There were no missing data in this research. Non-participation in the study could occur for various reasons. Before data collection, participants were informed that participation was voluntary, allowing those who chose not to participate to be non-participants in the study. Additionally, participants meeting exclusion criteria, such as age over 40 years, recent cesarean section within one month, or conditions posing risks during DRA examination, were also considered non-participants. However, there were no instances of non-participation in this study.

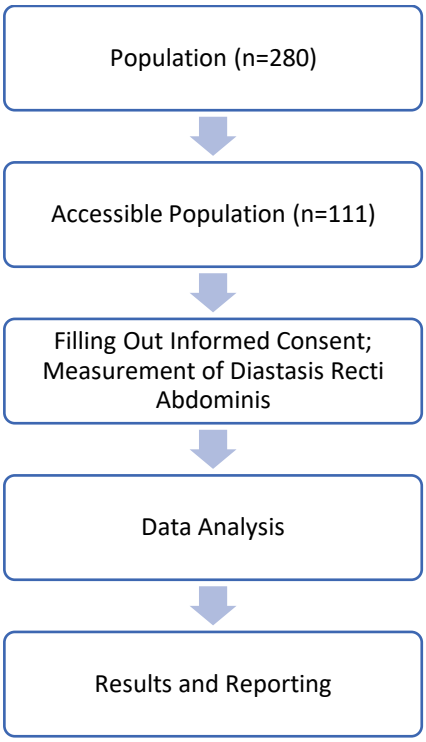

Figure 1. Flowchart Diagram

Descriptive analysis of sample characteristics can be found in Table 1 of the study results.

Table 1. Sample Characteristics Analysis

Variable	Frequency (n)	Percentage (%)
Age (years)		
20-25	41	36.9
26-30	56	50.5
31-35	12	10.8
36-40	2	1.8
Total	111	100
Body Mass Index		
Normal	93	83.8
Overweight	14	12.6
Obese	4	3.6
Total	111	100
Parity		
Primipara (one birth)	77	69.4
Multipara (two births)	25	22.5
Multipara (three births)	9	8.1
Total	111	100
DRA Incidence		
Mild DRA	13	11.7
Moderate DRA	0	0.0
Severe DRA	0	0.0
No DRA	98	88.3
Total	111	100

Based on Table 1, the age characteristics of the samples were predominantly in the 26-39 years range, comprising 56 samples (51.5%). This was followed by the 20-25 years range with 41 samples (36.9%), the 31-35 years range with 12 samples (10.8%), and the 36-40 years range with 2 samples (1.8%). Regarding body mass index (BMI),

the majority of samples were categorized as normal, totaling 93 samples (83.3%). Overweight samples accounted for 14 (12.6%), while obese samples accounted for 4 (3.6%). In terms of parity, the respondents included 77 primiparous women (69.4%), 25 multiparous women with two childbirths (25.5%), and 9 multiparous women with three childbirths (8.1%).

Based on this table, it can be observed that the classification of Diastasis Recti Abdominis (DRA) occurrences, particularly in the mild category, occurred in a small proportion of respondents, specifically 13 respondents (11.7%). The majority of respondents, 98 (88.3%), were found not to have DRA. Moderate or severe DRA categories were not found in this study. The distribution of DRA occurrences across each variable can be seen in Tables 2-5.

Table 2. Distribution of DRA Based on Postpartum Maternal Age

DRA Incidence	**Age**			
	20-25 years	26-30 years	31-35 years	36-40 years
Mild DRA	4 (9.8%)	5 (8.9%)	2 (16.7%)	2 (100%)
No DRA	37 (90.2%)	51 (91.1%)	10 (83.3%)	0 (0%)
Total	41 (100%)	56 (100%)	12 (100%)	2 (100%)

Based on Table 2, the occurrence of Diastasis Recti Abdominis (DRA) was most frequently found in the mild category. It was most prevalent among postpartum mothers aged 26-30 years, with 5 samples (8.9%), followed by the 20-25 years age group with 4 samples (9.8%), the 31-35 years age group with 2 samples (16.7%), and the 36-40 years age group with 2 samples (100%) with Mild DRA. Meanwhile, based on the table, occurrences without DRA were more prevalent across all age categories, specifically 37 samples (90.2%) in the 20-25 years age group, 51 samples (91.1%) in the 26-30 years age group, and 10 samples (83.3%) in the 31-35 years age group.

Table 3. Distribution of DRA Based on Body Mass Index (BMI)

DRA Incidence	Body Mass Index		
	Normal	**Overweight**	**Obesitas**
Mild DRA	8 (8.6%)	2 (14.3%)	3 (75.0%)
No DRA	85 (91.4%)	12 (85.7%)	1 (25.0%)
Total	93 (100%)	14 (100%)	4 (100%)

Based on Table 3, occurrences of Mild DRA were found in the normal BMI category, with 8 samples (8.6%), followed by the overweight category with 2 samples (14.3%), and the obesity category with 3 samples (75%). Instances without DRA were most prevalent in the normal BMI category, with 85 samples (91.4%), followed by 12 samples (85.7%) in the overweight category, and 1 sample (25.0%) in the obesity category.

Table 4. Distribution of DRA Based on Parity

DRA Incidence	Parity		
	Primipara	Multipara (two births)	Multipara (three births)
Mild DRA	3 (3.9%)	6 (24.0%)	4 (44.4%)
No DRA	74 (96.1%)	19 (76.0%)	5 (55.6%)
Total	77 (100%)	25 (100%)	9 (100%)

Based on Table 4, occurrences of Mild DRA were found in respondents as follows: 3 samples (3.9%) in primiparous women, 6 samples (24.0%) in multiparous women with two births, and 4 samples (44.4%) in multiparous women with three births.

DISCUSSION

The study targeted postpartum PKK mothers in Jimbaran Village. The total population for this study was 280 individuals. Based on calculations, the required sample size was initially determined to be 96, with an additional 10% included to account for potential dropouts, resulting in a total of 106 needed samples. However, during data collection, 111 individuals meeting the inclusion criteria were enrolled. This study included respondents aged between 20-40 years. Participant age information was obtained from identity cards and the Mother and Child Health (MCH) handbook brought by respondents during the study.

The age range of 20-40 years encompasses early adulthood, a dynamic phase of life characterized by progressive changes, including physical transformations. It is during this phase that a woman's reproductive organs function optimally. In this study, the majority of respondents fell into the 26-30 age group, comprising 56 out of 111 respondents (50.5%). Research by Fei et al. (2021) and Cardaillac et al. (2020) indicates that maternal age contributes to the incidence of DRA. As age increases, progressive bodily changes occur, leading to a decline in organ function, adipose tissue changes, and connective tissue elasticity, all contributing to muscle weakening. Muscle weakening significantly correlates with DRA incidence.

In this study, the majority of respondents were classified as having a normal BMI (83.8%), with 14 (12.6%) categorized as overweight and 4 (3.6%) as obese. International studies highlight obesity and high BMI as significant risk factors for DRA. This is attributed to increased abdominal cavity adipose tissue, such as omentum and mesentery, leading to heightened abdominal pressure and subsequent separation of the rectus abdominis muscles along the linea alba. Research by Wu et al. (2021) supports a correlation between BMI and DRA, suggesting that higher BMI increases the risk of DRA due to reduced muscle tone and strength, making muscles less capable of withstanding intra-abdominal pressure, thus predisposing them to separation along the linea alba.[11]

Paritas refers to the frequency of a mother giving birth to live or stillborn children, excluding abortions.[12] Information regarding parity among respondents in this study was obtained from the Maternal Health evaluation, specifically the pregnancy history and recorded number of births in the Maternal and Child Health (MCH) book held by respondents during the study. According to parity, or the number of births experienced by respondents, the majority were primiparous, having given birth once, totaling 77 individuals (69.4%). This was followed by those who had two pregnancies, numbering 25 individuals (22.5%), while those with three pregnancies were the fewest, totaling 9 individuals (8.1%). Pregnancy is recognized as a risk factor for Diastasis Recti Abdominis (DRA), as the abdominal muscles are affected during the uterus's enlargement throughout pregnancy.[13] The more pregnancies a woman experiences, the higher the likelihood of developing Diastasis Recti Abdominis (DRA). Women who have given birth multiple times are at increased risk of experiencing DRA.

Based on the research findings, most postpartum respondents did not exhibit Diastasis Recti Abdominis (DRA), totaling 98 individuals (88.3%), while the remaining 13 individuals (11.7%) showed mild DRA. This variation can be attributed to several factors such as delivery method, baby's birth weight, gestational age, duration of labor, maternal weight gain during pregnancy, physical exercise during pregnancy, and varying levels of tissue elasticity among individuals.

Overview of Diastasis Recti Abdominis Incidence Among Postpartum PKK Mothers in Jimbaran Village

Based on Table 2, the distribution of DRA incidence by age category shows the following results: in the 20-25 year age group, 4 out of 41 individuals experienced mild DRA; in the 26-30 year age group, 5 out of 56 individuals experienced mild DRA; in the 31-35 year age group, 2 out of 12 individuals experienced mild DRA; and in the 36-40 year age group, 2 out of 2 individuals experienced mild DRA. According to a study conducted by Tan et al. in China in 2022, which compared Inter Rectus Distance (IRD) values across different age groups at rest using ultrasound, it was found that IRD values increased with maternal age.[14] This can occur due to a decrease in tissue elasticity, primarily inducing changes in the mechanical properties of type I collagen, rendering it less elastic, along with hormonal changes in the body as one ages. The increase in non-contractile tissues such as adipose tissue and connective tissue can lead to a substantial decline in contractile tissue, resulting in muscle weakness and decreased muscle tone. This significantly affects the linea alba tissue because its main component is type I collagen, which can cause the linea alba to become less elastic, more prone to stretching, and contribute to the occurrence of Diastasis Recti Abdominis.[15] Individuals over the age of 30 experience a decrease in muscle elasticity, leading to a longer recovery time, especially in the abdominal muscles after childbirth.[13].

Age is considered to be associated with other factors that can influence the occurrence of diastasis recti abdominis. The safe age range for pregnancy in women is considered to be between 22-35 years. Generally, the ideal age for pregnancy is between 22-35 years because women in this age range typically have good physical conditions and high fertility.[16] According to Martinez-Galiano in 2019, women over the age of 35 are mostly multiparous. As women age, the likelihood of having multiple children increases.[17] This increases the likelihood of women over the age of 35 experiencing a higher incidence of diastasis recti abdominis (DRA).

According to Wu in 2020, the incidence of diastasis recti abdominis (DRA) is commonly found in women under the age of 45. This is because this age range is considered safe and is when many women are likely to become pregnant or give birth. This increases the likelihood of DRA occurring in women.[11] According to Yaseen et al. in 2022, the incidence of Diastasis Recti Abdominis (DRA) is most commonly found in the age range of 22-38 years. In a study conducted by Yaseen in Lahore, Pakistan, it was found that 70% of DRA cases occurred in the 22-28 age group, while 30% occurred in the 28-38 age group.[18]

Based on the frequency distribution table of DRA incidence by body mass index (BMI), it was found that mild DRA occurred in 8 out of 93 respondents with a normal BMI (8.6%), 2 out of 14 respondents with an overweight BMI (14.3%), and 3 out of 4 respondents with an obese BMI (75.0%). From this data, it can be concluded that DRA occurs in almost all respondents with an obese BMI. According to research conducted by Qu et al. in 2021, there is a correlation between BMI and the widening of the inter-recti distance (IRD).[19] According to Wu et al. in 2021, obesity is a risk factor that contributes to the incidence of DRA. Additionally, obesity can coincide with the loss of muscle tone, which causes the abdominal muscles to be unable to withstand pressure, thereby leading to the occurrence of DRA.[11] Obesity can lead to gradual weight gain and cause the rectus abdominis muscles to stretch above the umbilicus. It is also known that DRA occurs across all BMI categories, which can be attributed to several factors such as genetic conditions (collagen structure damage) and abdominal surgery.[1] Additionally, Sperstad in 2016 mentioned that DRA can be caused by several factors including weight gain during pregnancy, pre-pregnancy weight, type of delivery, birth weight of the baby, and others.[5] Thus, based on these factors, variations in the incidence of DRA are possible in each study. Factors such as weight gain during pregnancy, pre-pregnancy weight, type of delivery, birth weight of the baby, obesity, genetic conditions affecting collagen structure, and abdominal surgeries can all influence the occurrence and severity of diastasis recti abdominis in different populations and studies.

Based on the frequency distribution table of DRA incidence by number of births (parity), it was found that DRA occurred in 6 out of 25 multiparous respondents with 2 births, 4 out of 9 multiparous respondents with 3 births, and 3 out of 77 primiparous respondents. Women who have given birth more than once (multiparous) have a greater risk of increased inter-recti distance (IRD) compared to those who have given birth only once (primiparous). According to research by Alamer in 2019 in Ethiopia, multiparity is a risk factor for DRA due to the cumulative mechanical stress and pressure on the abdominal wall tissues from multiple pregnancies. The repeated mechanical stress significantly affects the distance between muscles, leading to muscle stretching.[20]

Pregnancy is confirmed as one of the factors that can cause DRA. The more pregnancies a woman experiences, the higher the risk of developing DRA.[21] Pregnancy causes changes in abdominal conformation due to

increased space in the uterus. These changes alter the elongation of the abdominal muscles by modifying the insertion angles, which can weaken the linea alba and result in increased separation between the rectus muscles.[22] Additionally, pregnancy causes hormonal changes and mechanical effects on the abdominal muscles. During pregnancy, there is an increase in levels of relaxin, progesterone, and estrogen, which soften connective tissues and weaken the linea alba. This occurs concurrently with mechanical tension on the anterior abdominal wall due to uterine enlargement, leading to separation of the rectus abdominis muscles along the linea alba.[22] Based on this, pregnancies occurring more than once can contribute to cumulative mechanical pressure on the connective tissues of the abdominal wall, thereby increasing the risk of developing DRA. In a study conducted by Kausar et al. in 2022, the incidence of DRA was found to be 22.7% in multiparous women.[23] In a study conducted by Fei et al. in 2021, multiparity was identified as a risk factor for DRA, with a prevalence of 56.3%.[24]

This study has several limitations. Firstly, it did not examine other contributing factors to DRA incidence, such as physical activity during pregnancy, which is an external factor known to vary in its impact on DRA width among individuals. Secondly, the study's sample consisted of postpartum mothers within 1-12 months, whereas DRA mostly occurs from the third trimester of pregnancy to 6-8 weeks postpartum. Consequently, the study did not capture many DRA cases. Lastly, the sample size of high-risk DRA individuals, such as those with obesity, was only 4, which may not adequately represent the population and does not meet standard respondent comparison ratios due to the unbalanced sample size.

CONCLUSION

This study concludes that mild Diastasis Recti Abdominis (DRA) was found in 13 out of 111 respondents (11.7%). The distribution of DRA incidence based on age groups shows that the majority of cases occurred in the 26-30 age group (8.9%), followed by the 20-25 age group (9.8%), the 31-35 age group (16.7%), and the 36-40 age group (100%). Based on Body Mass Index (BMI), DRA was most frequently found in respondents with obesity (75.0%). Regarding parity, the highest incidence of DRA occurred in multiparous respondents with 3 births (44.4%). These findings align with research by Wu et al. in 2021, which states that DRA is often found in individuals under 45 years of age, and obesity significantly contributes to DRA incidence.

These findings indicate that age, BMI, and parity are significant contributors to DRA incidence in postpartum mothers. Specifically, older respondents, those with higher BMI, and multiparous women are at greater risk of experiencing DRA. This study underscores the importance of weight management and postpartum health monitoring to reduce DRA risk. However, study limitations including potential selection bias and measurement constraints should be considered when interpreting the results. Further research is needed to explore other risk factors and the underlying mechanisms of DRA occurrence. The implications of these findings suggest that healthcare providers can educate and implement preventive measures for DRA among mothers and expectant mothers**.**

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