

## DIASTASIS RECTI AMONG PREGNANT AND POSTPARTUM WOMEN IN KANO, NIGERIA: A CROSS-SECTIONAL STUDY

### ABSTRACT

Diastasis Recti (DR) is a common muscular condition often present during and after pregnancy. This cross-sectional correlational study investigated the prevalence of DR among pregnant and postpartum women. A total of 250 pregnant and postpartum women were recruited using convenience sampling technique from obstetrics and gynaecology department, Aminu Kano Teaching Hospital, Kano, Nigeria. Age, body mass, height, BMI, parity, trimester, duration of DR postpartum, location of DR and DR status was recorded for each participant. Presence of DR was confirmed using the finger width method. Descriptive statistics of mean, SD, percentage were used to describe the data and determine the prevalence. Inferential statistics of Pearson's and Spearman's correlation were used to analyse the relationship between prevalence of DR and age, parity and duration of DR postpartum. Chi square was computed to determine the difference in prevalence of DR across trimesters. The result of this study indicated high prevalence of DR in postpartum and pregnant women (84% and 64.7% respectively); the most common location of DR was at the umbilicus in both pregnant and postpartum women. Prevalence of DR was high among the multigravida; and a significant relationship was found between prevalence of DR and age and parity of participants. There was a significant difference in prevalence of DR across the trimesters. It can be concluded that prevalence of DR among pregnant and postpartum women is high; age and parity are determinants of DR prevalence. Evaluation of DR should be considered as routine assessment in both pregnant and postpartum women.

### KEYWORDS

Diastasis Recti, Prevalence, Postpartum, Pregnancy, Location, Trimester

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## INTRODUCTION

Diastasis Recti (DR) is a muscular condition which occurs commonly during pregnancy and postpartum<sup>1-4</sup>; having main predisposing factors as multiple pregnancies, high body mass index, multiparity, large fetus, flaccid abdominal muscles and polyhydramnios<sup>5</sup>. It may be a transitory condition<sup>6,7</sup> or may remain throughout life<sup>2,3,8</sup>. Diastasis recti is a midline separation of the two rectus abdominis muscle along the linea alba which causes widening of the linea alba<sup>1,9</sup>. This condition is the most obvious visible change during and after pregnancy (postpartum)<sup>10,11</sup>.

Hormonal changes caused by relaxin, progesterone and estrogen coupled with growth of the uterus during pregnancy may stretch the abdominal muscles, which may affect the rectus abdominal muscles<sup>12-14</sup>; thus leading to occurrence of DR<sup>15</sup>. Excessive distension may interfere the function of the abdominal muscles in stabilizing the trunk and this may lead to development of lumbar pain<sup>2,8</sup>. Diastasis recti may appear as a ridge running in the midline of the abdomen, between the xyphoid process and the umbilicus. Straining the abdominal muscles makes the DR more prominent, though it may disappear once relaxed<sup>16</sup>.

Diastasis recti commonly occur in women who have had multiple pregnancies, because the muscles have become stretched during each pregnancy<sup>17,18</sup>. Expansion of the abdomen is the most visible change that occurs during pregnancy causing some abdomens to become extensively damaged with very few accommodating this stretch<sup>10</sup>.

In early pregnancy, the signs of DR include extra skin and soft tissue in the front of the abdominal wall<sup>17,18</sup>. However, with increasing size of abdomen during pregnancy, the top of the uterus bulges out of the abdominal wall with an outline of some parts of the fetus in severe cases of DR<sup>17,18</sup>. Diastasis recti of different severities that occur in pregnancy may not resolve on its own postpartum<sup>17</sup>.

Boissonnault and Blaschak<sup>19</sup> reported a greater prevalence of DR during pregnancy (in the 3<sup>rd</sup> trimester) than during the early postpartum period. Boissonnault and Blaschak<sup>19</sup> also reported a higher prevalence of DR in immediate postpartum period than in later postpartum period. There was a high

prevalence of postpartum DR in the study conducted by Spitznagle et al<sup>3</sup>. With respect to parity, Lo, Candido and Janssen<sup>20</sup> reported a high prevalence of DR postpartum among multiparous compared to nulliparous and the incidence of DR increases with increasing age and parity of the mother. Similarly, Spitznagle et al<sup>3</sup> reported a comparatively higher prevalence of DR among older (over 50 years) and multiparous women as compared to a study conducted by Lo et al<sup>20</sup>. The location of DR has been found out to vary at the umbilicus, above or below the umbilicus<sup>4,15,19</sup> and this information is yet undiscovered in this part of the country.

A number of studies<sup>3,11,19,21,22</sup> reported that the presence of DR can predispose an individual to certain conditions such as affectation of trunk stability, respiration, bowel movement, visceral support, and urinary as well as fecal incontinence. Studies have not been carried out here in Kano concerning DR. Thus, the major purpose of this study was to determine the prevalence of DR in primigravida and multigravida pregnant and postpartum women at different DR locations in Kano, Nigeria. Also, this study determined relationship between the prevalence DR, age, parity and duration of DR postpartum.

## METHODS

This study is a cross-sectional correlational study. The population of this study comprised of pregnant and postpartum women in Obstetrics and Gynecology (O & G) department, Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria. A total of 250 subjects were drawn from O&G department, both antenatal and post-natal clinics, AKTH, Kano. Convenient sampling technique was employed for the recruitment of study participants with the following inclusion and exclusion criteria:

### Inclusion Criteria

Subjects aged between 15-55 years; both pregnant and postpartum women; postpartum women who have had either normal delivery/ caesarian section (CS); recruitment would be 8 weeks postpartum.

### Exclusion Criteria

Women with abdominal surgeries (except CS)

### Data Collection Instrument

These included:

- 1) Finger width method<sup>19</sup>: This was used to determine the presence DR.
- 2) Stadiometer (SECA gmbh/Germany): This was used to assess height and body mass of participants.

### Data Collection Procedure

Approval to conduct the study was sought from the ethical committee of AKTH, Kano. Subjects were recruited from O & G department, both the ante-natal and post-natal clinics, AKTH. They were provided with information concerning the study and a consent form to sign. The following were recorded:

- 1) Age: The age of participants was recorded in years.
- 2) Parity: The number of deliveries was recorded.
- 3) Duration of DR Postpartum: This was recorded in weeks/months.
- 4) Stature: Participants height was measure barefoot or wearing thin socks. The participants were instructed to stand with their back against the stadiometer with their heels together. The horizontal bar was placed down firmly onto the top of the head and the measurement was recorded<sup>23</sup>.
- 5) Body Mass: Participant weights were measured using a standard weighing scale with provision for calibration. Subjects were asked to present themselves in light clothing and to remove all heavy objects prior to measurement. They were then instructed to step on the weighing scale barefooted and stand erect, with the face looking straight forward and their hands by the side. The reading was then taken and recorded to the nearest 0.5kg<sup>24</sup>.
- 6) Body Mass Index (BMI): BMI is computed by dividing the participants' weight in kilogram to the square of their height in meter<sup>25</sup>.  
$$BMI^{26} = \text{Body mass (kg)} / \text{Stature (m}^2\text{)}$$
- 7) Trimester: This was recorded as first, second or third trimester.
- 8) Location of DR: this was recorded as either above, at or below the umbilicus.
- 9) Inter-recti distance & location of DR: The subjects were examined for the presence of DR using the finger width technique. DR was measured with fingers because that is the easiest way to tell exactly how far the muscles have separated. Diastasis recti was classified as present or absent according to Nobles criteria<sup>1</sup>, that is, any separation above, below or at the umbilicus of less than or equals to two finger width was considered normal and anything greater constitute a DR. When using the finger width technique, the subject lay supine with the hip and knee flexed at 90°, feet flat and arms extended. The subject was then instructed to perform a forward trunk flexion until the inferior angle of the scapula is off the bed.

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The reference points for DR measurement are at, above and below the umbilicus. The assessor places the fingers perpendicularly between the rectus abdominis muscles on forward flexion of the trunk. The number of fingers between the medial edges of the rectus abdominis muscles, above and below the umbilicus, was used to grade the severity of diastasis. Each finger breadth is assumed to represent 1.5 cm. Diastasis recti was considered present and relevant if the separation was greater than 2 cm between the two recti muscles.

10) Location of DR: This was recorded as above, at or below the umbilicus.

**Data Analysis Procedure**

Descriptive and inferential statistics were used to analyze data. The mean and standard deviation was used to describe the age, body mass and stature of study participants. Simple percentage was computed to determine the most common location of DR and the prevalence of DR. Pearson product moment correlation was used to determine the relationship between the prevalence of DR with mothers' age and duration postpartum. Spearman rank order correlation was computed to determine the relationship between the prevalence of DR and parity. Chi square was used to determine significant difference in prevalence of DR across the trimesters. Statistical package for Social Sciences (SPSS) version 15.0 was used to analyze data. Probability level of 0.05 or less was considered in all analysis.

**RESULT**

A total number of 250 subjects participated in this study; 150 pregnant and 100 postpartum women. The duration of DR postpartum was within the range of 8 weeks to 2 years. The participants have been described in Table 1. It shows that the participants fall within the middle age and normal BMI category.

<b>Variables</b>	<b>Pregnant Women (n=150) Mean+SD</b>	<b>Postpartum Women (n=150) Mean+SD</b>
<b>Age (years)</b>	28.88+7.2	29.22+5.5
<b>BM (kg)</b>	65.63+12.1	62.24+11.5
<b>Stature (m)</b>	1.61+0.93	1.61+0.85
<b>BMI (kg/m<sup>2</sup>)</b>	25.34+4.75	24.03+3.97

DR status of participants (pregnant and postpartum) is shown in table 2 and it is categorized as either present or absent. Table 2 shows that there is a high prevalence of DR among both pregnant and postpartum women have DR.

<b>DR Status</b>	<b>Pregnant Women n (%)</b>	<b>Postpartum Women n (%)</b>	<b>Total</b>
<b>Absent</b>	53(35.3%)	16 (16.0%)	69 (27.6%)

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<b>Present</b>	97 (64.7%)	84 (84.0%)	181 (72.4%)
<b>Total</b>	150 (100%)	100(100 %)	250 (100%)

The site of DR of all study participants (pregnant and postpartum women) is shown in the table 3. The umbilicus was the most common site for DR in both pregnant and postpartum women, followed by DR above the umbilicus with the least proportion of women having a DR below the umbilicus.

Site of DR	Pregnant Women n (%)	Postpartum Women n (%)
<b>Above umbilicus</b>	53 (35.3)	38 (38.0)
<b>At umbilicus</b>	98 (65.3)	84 (84.0)
<b>Below umbilicus</b>	21 (14.0)	11(11.0)
<b>Total</b>	150 (100)	100 (100)

Prevalence of DR with respect to number of pregnancies (parity) is shown in table 4. It shows that DR is more prevalent in multigravida.

DR	Primigravida n (%)	Multigravida n (%)	Total n (%)
<b>Absent</b>	47 (60.3)	22 (12.8)	69 (27.6)
<b>Present</b>	31(39.7)	150 (87.2)	181 (72.4)
<b>Total</b>	78(100)	172(100)	250 (100)

Prevalence of DR across the trimesters among pregnant women is shown in table 5. There is equal number of participants in each trimester. Majority of participants in the second and third trimester were diagnosed with DR, with very few having DR in the first trimester.

DR Status	First Trimester n (%)	Second Trimester n (%)	Third Trimester n (%)	Total n (%)
Absent	27(54)	15 (30)	11 (22)	53 (35.3)
Present	23(46)	35 (60)	38 (76)	96 (64)
<b>Total</b>	50(33.3)	50 (33.3)	50 (33.3)	150 (100)

Table 6 shows the relationship between prevalence of DR and age, parity and duration of DR postpartum using Pearson's and Spearman correlation. There is a significant positive relationship ( $P < 0.05$ ) between prevalence of DR and age. Similarly, there is also a significant positive relationship ( $P < 0.05$ ) between prevalence of DR and parity. This can further be explained; as age and parity increases, prevalence of DR increases.

Variables	r	p-value
Age	0.35**	0.00
Parity	0.47**	0.00
Postpartum Duration	-0.18	0.06

The difference in prevalence of DR across the trimesters of pregnancy using Chi-square is shown in table 7. There is a significant difference ( $P < 0.05$ ) in prevalence of DR across the three trimesters.

		Trimesters				X <sup>2</sup>	p-value
		First	Second	Third	Total		
		DR Status					
Absent	FO	27.7	15	11	53	12.14*	0.002
	FE	17.7	17.7	17.7	53.3		
Present	FO	23	35	39	97		
	FE	32.3	32.3	32.3	97.0		
Total	FO	50	50	50	150		
	FE	50.0	50.0	50.0	150.0		

## DISCUSSION

The prevalence of DR in this study was found to be high in pregnant women and postpartum women. This is consistent with the result of Boissonnault and Blaschak<sup>19</sup> who reported high prevalence of DR during pregnancy and following delivery. Lo et al<sup>20</sup> also reported a higher prevalence of DR in postpartum women which is also in line with the findings of this study. The findings of this study also show that DR may not resolve spontaneously after pregnancy. This can be as a result of the continuous stress and stretch on the soft tissues of the abdominal wall exerted by the gravid uterus during pregnancy and poor abdominal conditioning. The number of pregnancies (parity) or children a woman has can also contribute to the high prevalence of DR in the population studied. The results also suggest that advancing pregnancy influences the strength of linea alba and in many cases results in a separation between the recti muscles.

This study revealed that majority of pregnant and postpartum women had DR at the umbilicus, followed by DR above the umbilicus with least proportion below the umbilicus. Boissonnault and Blaschak<sup>19</sup> found that majority of participants in their study had DR at the umbilicus with some above the umbilicus and very few below the umbilicus, similar to the findings of this study. Parker, Millar and Dugan<sup>4</sup> found the most common location for DR to be at the umbilicus, which is in line with the findings of this study. This could be explained by the fact that the anterior aspect of the rectus sheath is presumed to be stronger below the umbilicus<sup>19</sup>; this increased reinforcement might be enough to prevent separation in this area. Another probable reason for it being the most common at the umbilicus is because of the stretch the soft tissues are subjected to which is exerted by the growing fetus during pregnancy. This stretch tends to be more at the umbilical region.

There was a relationship between the prevalence of DR and age and parity. These results support previous studies reporting a strong relationship between the presence of DR and age and parity<sup>2,19,20</sup>. Diastasis recti was higher in women with greater parity; this finding is similar to the finding of Chiarello, Falzone, McCaslin, Patel and Ulery<sup>2,20</sup>. Also, it was found out that DR is more common in multiparous women. This can be as a result of weak abdominal wall muscles or as a result of repeated stretch of the abdominal wall muscles due to previous pregnancies. Other factors such as poor abdominal conditioning may have contributed to separation contributing to the deterioration of DR<sup>2</sup>. Age is also a precipitating factor that can facilitate the appearance of a DR because as a woman ages, the abdominal and other muscles in the body tends to be weak.

The prevalence of DR across the trimesters varies in pregnant women. The study result indicated that the prevalence of DR is highest in the third trimester of pregnancy. This is consistent with the findings of Boissonnault and Blaschak<sup>19</sup> who reported the prevalence of DR to be higher in the third trimester followed by second trimester. This can be as a result of hormonal changes coupled with growth of the fetus in the uterus which cause stretching of the abdominal muscles.

Prevalence of DR did not differ between pregnant and postpartum women. This is not consistent with the findings of Boissonnault and Blaschak<sup>19</sup> who reported a greater prevalence of DR during pregnancy than the immediate postpartum duration. A number of factors could have accounted for this outcome: poor abdominal conditioning before and during pregnancy and other factors that could precipitate DR. Limitations of the study include varied sample size within the group between pregnant and postpartum women. Also, the age range was high, hence increasing the standard deviation of the result.

### **CONCLUSION**

Prevalence of DR is high in pregnant and postpartum women and it is related to mothers' age and parity. The most common site of DR was at the umbilicus in both pregnant and postpartum women. Evaluation of DR should be considered a routine assessment in both pregnant and postpartum women to ascertain those who would need attention. All women with DR need to receive physical therapy management soon postpartum for a better recovery. Also, physical activity during pregnancy is also recommended.

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