MERIT RESEARCH JOURNALS
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Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 6(1) pp. 034-041, January, 2018
Available online http://www.meritresearchjournals.org/mms/index.htm


*Original Research Article*

# Body Adipose Tissue Association with Incidence of Cesarean Section in Saudi and Alshikh Mohamed Ali Fadul hospital in Sudan 2017-2018

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**Abstract**

**This is a descriptive cross-sectional study conducted in Alshikh Mohamed Ali Fadul hospital in Omdurman City-Sudan during January 2017 – January 2018. The main aim was to identify the association of body adipose tissue with an incidence caesarean section in pregnant women. In antenatal clinic as per protocol 150 pregnant women in their third trimester after taking a detailed obstetrical history and clinical examination. After completion of the one year data regarding the detailed obstetrical and surgical history were recorded in a questionnaire and analyzed using descriptive frequency, crosstab and linear regression 94 (62.67%) women were diagnosed as cases of cesarean section. The overall incidence of cesarean section was found to be 79 (53.0%) body adipose tissue and 98 (65%) foot size. It was evident from the study that body mass index takes prize of risk factors of caesarean section as follows linear regression equations:**

**Prize = 1.961+ (-0.117-) Body Adipose Tissue (P =0. 003<0.05).**
**Y = (-1.141-) + (-0.125-) Body Adipose Tissue + (0.084) Foot Size(P =0. 001& 0.018<0.05).**

**Keywords:** Obesity, Body mass index, Adipose tissue, risk factors of cesarean section, labour management.

## INTRODUCTION

The Body Mass Index (BMI) or Quetelet index is a controversial statistical measurement which compares a person's weight and height. Though it does not actually measure the percentage of body fat, it is used to estimate a healthy body weight based on how tall a person. Due to its ease of measurement and calculation, it is the most widely used diagnostic tool to identify weight problems within a population, usually whether individuals are underweight, overweight or obese (Eknoyan, 2008).

Obesity is an increasing health problem in developed countries, particularly among women of reproductive age. Although it is often stated that obesity is a risk factor in obstetrics and most obstetricians feel intuitively that pregnancies of obese women involve increased maternal and neonatal morbidity, data regarding the real impact of the preconception BMI on the outcome of these pregnancies are limited. Several studies document an increased rate of diabetes, hypertensive pregnancy disorders, fetal deaths, obstetrical problems such as shoulder dystocia, and post-operative morbidity caused by a higher frequency of cesarean section (Cnattingius et al., 1998; Cedergren, 2004; Kristensen et al., 2005; Kabiru and Raynor, 2004; Skrablin et al., 2004).

In addition studies show that wound complications in

obese women undergoing cesarean delivery may be reduced by closure of the subcutaneous tissue in women with at least 2 centimeters of subcutaneous adipose tissue. Whereas, prophylactic use of subcutaneous drainage does not prevent significant wound complications after cesarean delivery. A vertical skin incision appears to be associated with a higher rate of wound complications than a transverse incision (Chelmow et al., 2004; Wall et al., 2003).

Obesity is a well-established risk factor for maternal and neonatal morbidity. The effect of maternal obesity on adverse perinatal outcomes such as preeclampsia, gestational diabetes, preterm birth, and macrosomia is well established (Castro and Avina, 2002; Colman-Brochu, 2004; Doyle and Monga, 2004; Abenhaim et al., 2007; Kristensen et al., 2005; Smith et al., 2007). Among the different adverse perinatal outcomes observed in obese women, a consistent increase in the incidence of Caesarean section has been associated with increased BMI or degree of obesity (Barau et al., 2006; Dempsey et al., 2005; Graves et al., 2006; Kaiser and Kirby, 2001; Sheiner et al., 2004; Vahratian et al., 2005). This increase in Caesarean section has been observed among all women, and even more so among women with a previous Caesarean section (Bujold et al., 2005; Durnwald et al., 2004; Hibbard et al., 2006; Juhasz et al., 2005; Landon et al., 2005).

Other study demonstrated that BMI category is strongly associated with differences in the management of labour and delivery. Importantly, these differences may in part explain the well-established association between obesity and an increased risk of Caesarean section. Because of the potential morbidities associated with Caesarean section (Haim et al., 2011).

A total of 351 women who gave birth in the Paddington and North Kensington Health District were studied in order to establish a factual basis for recording height and shoe size as indicators of pelvic adequacy. Because only 19 women had radiological pelvimetry assessment, type of delivery and length of labour were used as proxy measures of disproportion. Of the 57 women with a shoe size less than 4 1/2, 21% were delivered by caesarean section compared with 10% of the group with shoe size between 4 1/2 and 6 and only 1% of the group with shoe size greater than or equal to 6 1/2. Similar relations with height were not generally found. The data were further examined using logistic regression models of the expected percentages of mothers having an adverse delivery (Frame et al., 1985).

A total of 563 white primigravid patients at Raigmore Hospital, Inverness, were recruited in a prospective study to examine the association between maternal height, shoe size, and the outcome of labour. There was a significantly increased caesarean section rate in women of short stature but no association between mode of delivery and shoe size. Babies born vaginally had heavier birth weights with increasing height and shoe size. Babies born by caesarean section were heavier than those born vaginally, but their birthweight showed no relation with either height or shoe size. Shoe size is not a useful clinical predictor for the probability of cephalopelvic disproportion, and, although maternal height is a better clinical guide to pelvic adequacy in labour, 80% of mothers less than 160 cm tall delivered vaginally. A well conducted trial of labour should be considered in all primigravid patients with cephalic presentation irrespective of maternal height or shoe size if no obstetric complication exists (Mahmood et al., 1988).

Other previous study found a statistically significant positive correlation between maternal height and vaginal delivery but no correlation with maternal shoe size was found. This study also showed that Caucasian women were significantly more than twice as likely to achieve vaginal delivery compared with Africans. Maternal height of at least 162.5 cm, has a sensitivity of 74% and a specificity of 43% for predicting vaginal delivery. We concluded that the most predictive anthropometric measurement for vaginal delivery is maternal height (Okewole et al., 2011).

## MATERIALS AND METHODS

This is a descriptive cross-sectional study conducted at the department of obstetrics and gynecology in Alshikh Mohamed Ali Fadul hospital in Omdurman City-Khartoum State in Sudan. It was conducted during the period January 2017 to January 2018. In the antenatal clinic as per protocol150 pregnant women were selected for the study. The inclusion criterion was a pregnant lady in her third trimester of pregnancy. The doctor and staff nurse on duty were trained to enter the data in a Questionnaire. Anthropometric measurements taken were height, body weight, body mass index (BMI), back length (BL), shoe measurement (SM), pelvic measurement (PM), abdominal circumference (AC).

Then the women with pregnant were further examined for their detailed obstetrical history-especially the history of previous caesarean section, maternal age and socioeconomic status. The electronic body scale is a high precision electronic scale for the use of computing weight (from150to 200kg) and height (from70 to190). (BMI) is the body weight divided by the square of his or her height. The formulae universally used in medicine produce a unit of measure of weight (kg) / height $^2$(m2).

The BMI is used to screen persons for weight categories that may lead to health problems Table 1 (Screening for obesity in adults: recommendations and rationale. Ann Intern Med., 2003).

After completion of the one year, data regarding the detailed obstetrical and surgical history were recorded in a questionnaire and analyzed using SPSS Software.

**Table 1.** Shows Body Mass Index is used to Screen Persons for Weight Categories

| BMI | Category |
|---|---|
| = <18.5 | Underweight |
| = 18.5-24.9 | Normal weight |
| = 25-29.9 | Overweight |
| 30 -34.9 | Obese- Class I |
| 35 - 39.9 | Obese- Class II |
| 40 and above | Obese- Class III |

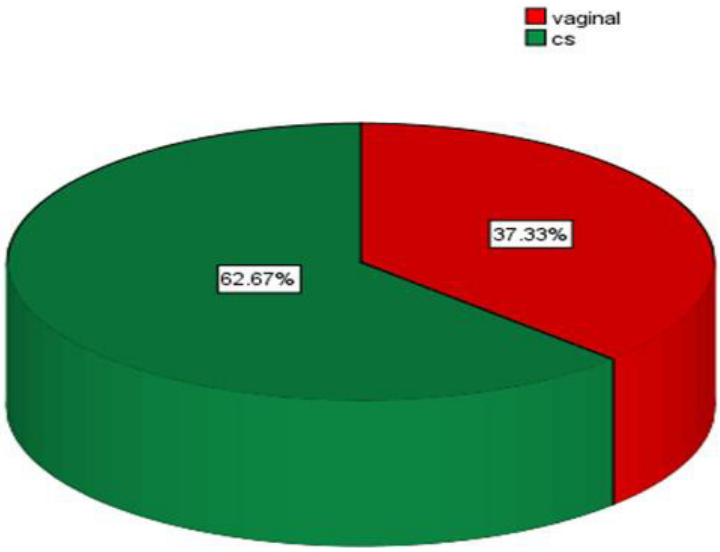



**Figure 1.** Descriptive Frequency Percentage Delivery Mode

**Table 2.** Shows the Distribution of Body Mass Index Categories

| BMI | Categories | Total frequency % |
|---|---|---|
| = <18.5 | Underweight | 1(0.7%) |
| = 18.5-24.9 | Normal weight | 70(46.7%) |
| = 25-29.9 | Overweight | 40(26.7%) |
| =30 -34.9 | Obese- Class I | 30(20.0%) |
| =35 - 39.9 | Obese- Class II | 7 (4.7%) |
| 40 and above | Obese- Class III | 2(1.3%) |
| Total | | 150 (100 %) |

## Statistical Methods

The data were analyzed using (SPSS Software) statistical social package for social sciences (Version 20 SPSS, Chicago, Illinois USA). Descriptive statistics were calculated for every measured variable, in order to evaluate the studied sample. All analyses were performed using the linear regression stepwise method, descriptive frequency and crosstabs probabilities and a P value of p <0.05 was considered statistically significant.

## RESULTS

Data collected from January 2017 to January 2018 from the department of obstetrics and gynecology in Alshikh Mohamed Ali Fadul Hospital was analyzed. The percent of frequencies were calculated to examine the relationship between the number of caesarean section and obesity. 94(62.67%) women were delivered by cesarean section and 56 (37.33%) by vaginal delivery out of the 150 studied pregnant women, were identified through descriptive frequency (Figure 1).

Table 2 shows the distribution frequency percentage of pregnant woman's body adipose tissue as following manner: Underweight; 1(0.7%), Normal weight; 70(46.7%), Overweight; 40 (26.7%), Obese- Class I; 30(20.0%), Obese - Class II; 7 (4.7%), Obese- Class III; 2 (1.3%) and also Figure 2 explains frequency count of fat body mass index categories.

The Table 3 displays the frequency ratio of foot size of pregnant women whose participants in this study as

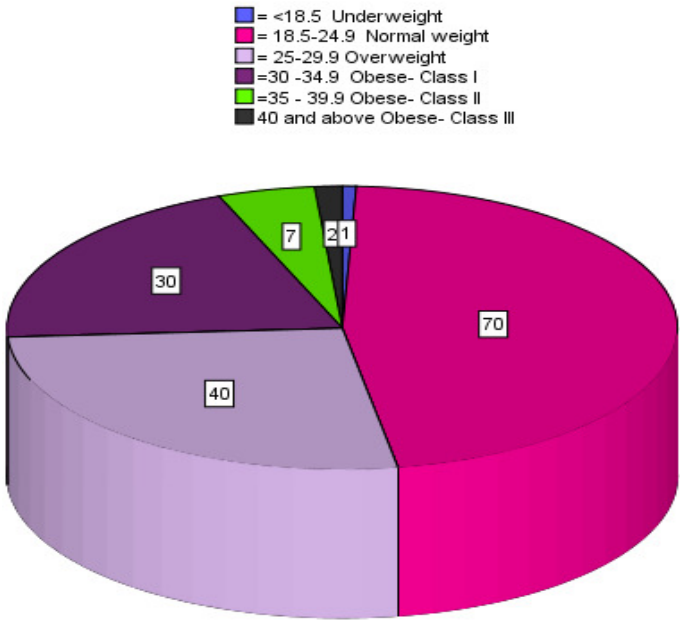



**Figure 2.** Shows the Frequency of Body Mass Index Categories

**Table 3.** Shows the Distribution Frequency Percentage of Shoes Measurement

| Shoes measurement | Categories | Total frequency % |
|---|---|---|
| = 36 (23 cm) | Small foot | 36(24.0%) |
| = 37 (23.4 cm) | Small foot | 62(41.3%) |
| = 38 (24.3 cm) | Large foot | 44 (29.3%) |
| =41 (26.4 cm) | Large foot | 8 (5.3%) |
| Total | | 150 (100 %) |

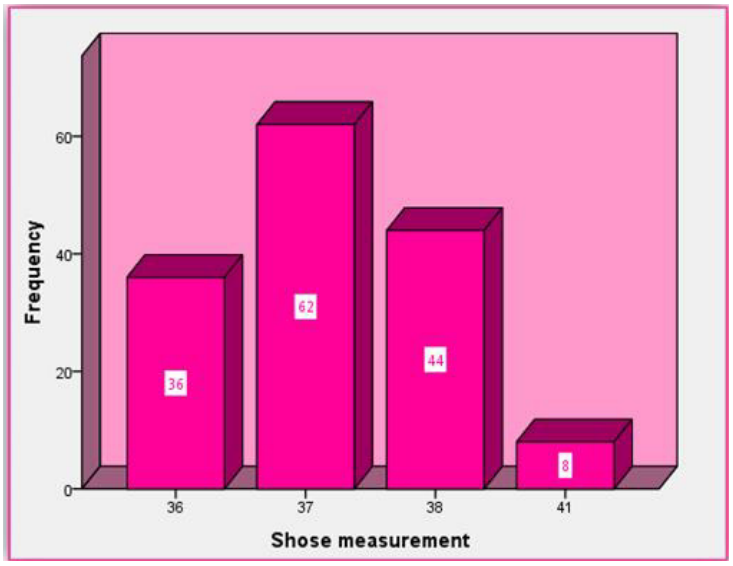
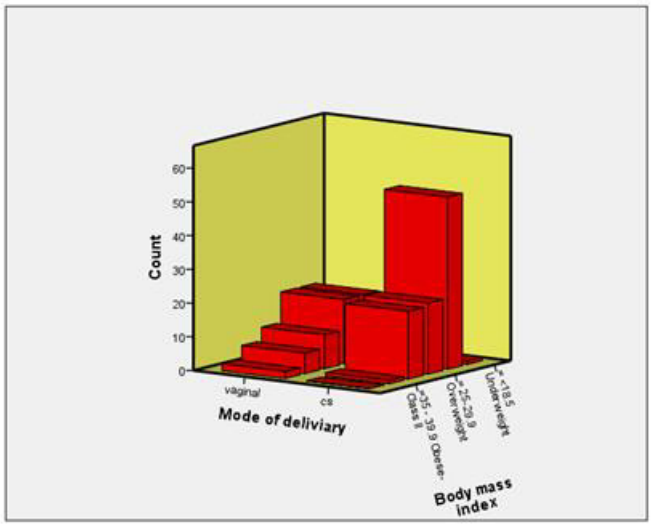



**Figure 3.** Explains Frequency Count Groups Feet Size

follows: groups feet measured; 36 (23cm) its 36 (24.0%), 37 (23.4 cm) its 62 (41.3%) these groups have small feet, other groups; 38 (24.3 cm) its 44 (29.3%), 41 (26.4 cm) its 8 (5.3%) these groups have large feet. Also Figure 3 shows Colman represent 36 and 62 participants have 36 (23 cm) and 37(23.4 cm) feet mea-

**Table 4.** Shows the Impact Variables Entered Linear Regression Equation Lead to Mode Delivery Section

| Dependent Variable (Mode delivery) | Independent Variables Entered equation | Constant (Beta) | P- value Sig. ≤0.05 | Odds ratio (95% CI) Constant | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| Model 1[a] | Body Adipose tissue (BMI) | -0.117- | 0.0031.7282.194 | | |
| | | | -0.194--0.040- | | |
| Model 2[b] | Body Adipose tissue (BMI) | -0.125- | 0.001 | -3.577-1.295 | |
| | | | -0.201--0.049- | | |
| | Foot size | 0.084 | 0 .0180.0130 .149 | | |
| General Constant | | 1.961[a] | -1.141-[b] | | |
| Method: Stepwise (Criteria: Probability-of-F-to-enter <=0 .050 | | | | | |



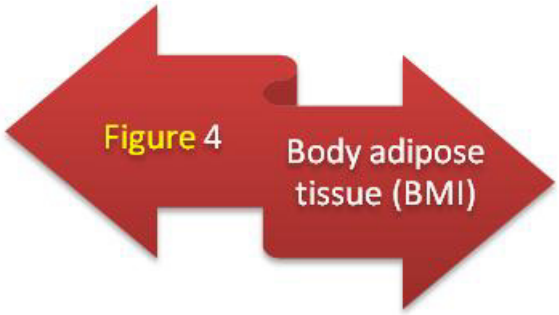
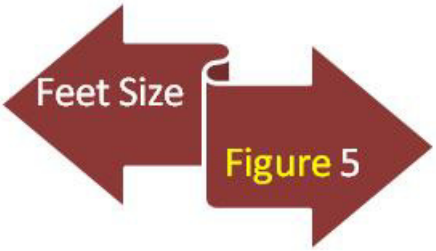




**Figure 4.** Shows Overweight Association the Mode Delivery Section



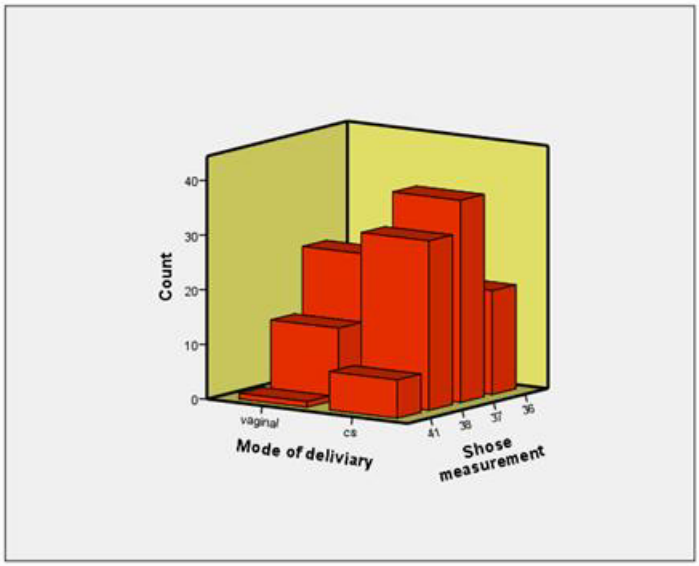




**Figure 5.** Explains the Relationship Between Small Feet Size and Mode Delivery Section

**Table 5.** Shows the Variables Excluded Linear Regression Equation and not Affected of Mode Delivery Section

| Dependent Variable | Independent Variables Excluded equation | Partial Correlation | P- value Sig. ≤ 0.01 | Collinearity Statistics (Tolerance) |
|---|---|---|---|---|
| Mode delivery section | Age | 0.130 | 0.116 | 0.994 |
| | Height | 0.095 | 0251 | 0.873 |
| | Pelvis inlet | -0.030- | 0.713 | 1.000 |
| | Pelvis cavity | 0.031 | 0.705 | 0.906 |
| | Pelvis outlet | 0.141 | 0.087 | 0.799 |
| | Pelvis biparaital | -0.043- | 0.602 | 0.949 |
| | diagonal | -0.077- | 0.349 | 0.947 |
| Method: Stepwise (Criteria: Probability-of-F-to-remove >= 0 .100) | | | | |

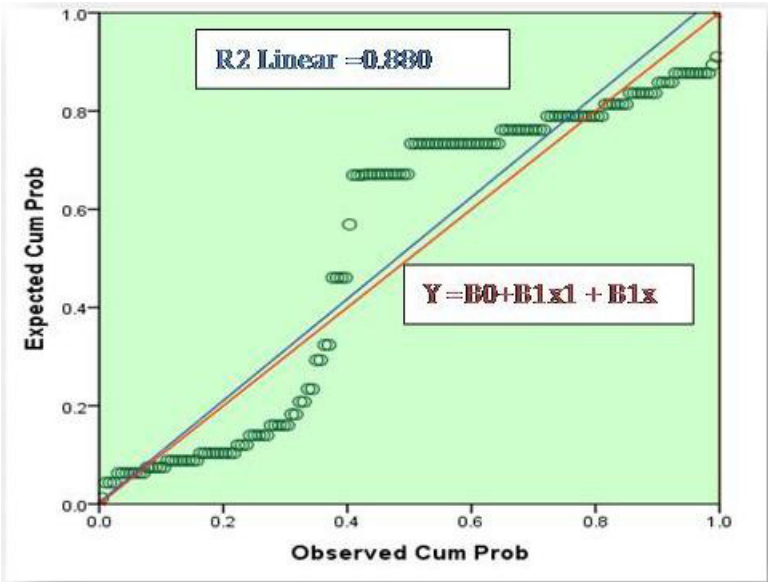



**Figure 6.** Displayed Entered and Excluded Variables Linear Equation Regression

surement and rest Colmanas normal size foot.

Table 4 describes the data available which analyzed by linear regression, and determined which a risk factors and arranged variable entered equation. Among mode delivery women, the adjusted statistic significant for fatty body or body mass index and foot size wire -3.577- (95% CI= -0.201-0.013) and 1.295 (95% CI =1.26-5.07), respectively, p- value≤ 0.05, compared with other excluded equation variables (Table 5) however, there was no positive linear association with cesarean section. In overweight and obese women, complications were significantly increased with inadequate body fatty tissue during pregnancy ($p < 0.001$ and $= 0.0180$, respectively).

Linear regression models the relation between a dependent variable (y) and one or more independent variables ($X_1$, $X_2$, $X_3$). Using linear regression equation: $y = B_0 + B_1x_1 + B_2X_2$ (Figure 6), where $B_0$ is the constant, $B_1$ is the regression coefficient (Rencher et al., 2012). The risk factors included a linear equation as the following:

*Price = 1.961+ (-0.117-) Body Adipose Tissue*

*Y = (-1.141-) + (-0.125-) Body Adipose Tissue + (0.084) Foot Size*

Table 5 shows the variables excluded equation regression and it's not affected to incidence mode delivery section in this study. Poorly partial correlation, and also this variables tolerance line regression as the values listed in Table 5. And even showed its insignificance at the level; model -1 (P- value ≤ 0.05) and model-2(P- value ≤ 0.01).

## DISCUSSION

Obesity is a fixed risk factor for the incidence of cesarean section*.As in previous studies, with authors (Barau et al., 2006; Dempsey et al., 2005; Graves et al., 2006; Kaiser

and Kirby, 2001; Sheiner et al., 2004; Vahratian et al., 2005) observed in obese women, a consistent increase in the incidence of Caesarean section has been associated with an increased BMI or degree of obesity. My results establish that increasing fatty body tissue is strongly associated with caesarean section incidence.

Another study; Haim A. and et al demonstrated that BMI category is strongly associated with differences in the management of labor and delivery. Importantly, these differences may in part explain the well-established association between obesity and an increased risk of Caesarean section; this study also confirms my findings BMI a price risk factor of cesarean section "Price = 1.961+ (-0.117-) Body Adipose Tissue".

In the present study, a mode delivery section in women with overweight BMI (25.0–29.9) and increase the degree of obesity a proved optimal, and my result reinforced outcomes of previous studies in this field.

There was a significantly increased caesarean section rate in women of short stature, but no association between mode of delivery and shoe size recommended by Mahmood TA and et al and Okewole IA and et al found a statistically significant positive correlation between maternal height and vaginal delivery ($p = 0.04$), but no correlation with maternal shoe size, but what I have found in my study is not consistent with what these authors have said. I found feet or shoe size factor lead to mode delivery section confirmed Frame S and et al study recommended: the type of delivery and length of labor was used as proxy measures of disproportion. Of the 57 women with a shoe size less than 4 1/2, 21% were delivered by caesarean section compared with 10% of the group with shoe size between 4 1/2 and 6 and only 1% of the group with shoe size greater than or equal to 6 1/2.

## CONCLUSION

I have revealed that body fat tissue and foot size were strongly associated with mode delivery. Importantly association between obesity and an increased risk of cesarean section. The risk factors included a linear equation as the following:

Price = 1.961+ (-0.117-) Body Adipose Tissue
Y = (-1.141-) + (-0.125-) Body Adipose Tissue + (0.084) Foot Size

## ACKNOWLEDGEMENTS

Many thanks and appreciations go to member of Saudi and Alshikh Mohamed Ali Fadul Hospitals in Omdurman city in Sudan. Many pleasures and appreciation owed to many people who contributed knowingly and indirectly to this work. I also thank all authors whose work were cited in this research. Many thanks and appreciations go to everyone who encouraged and supported the idea of this work.

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