The effect of Caesarean Section on Body Weight and Waist Circumference among Women in Al Nasiriya City

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Abstract

**Background:** The population worldwide has faced a growing epidemic of abdominal obesity, the prevalence of overweight and obesity is increasing in both developed and developing countries. The aim of study is to show consequence of caesarean operation on body BMI and compare this with normal deliver vaginally. **Method:** across sectional study for 500 females done in Al Haboobi and Bent Al Huda teaching hospital all females came to this hospital for obstetric and gynecological outpatients. Abdominal obesity of females measured by waist boundary> 88 cm. **Results:** prevalence of obesity in females not pregnant was 64%, significant effect by mode of delivery (Abdominal obesity was more among women who had history of caesarean section in comparison with women who had history of normal vaginal delivery (p=0.0001) and rate of general obesity was 48.8% and overweight was 33.4% the general obesity was more among women who had history of caesarean section in comparison with women who had history of normal vaginal delivery (p=0.0001). **Conclusion:** 2/3 of females that not pregnant have obesity. So must caring non-pregnant females by antenatal caring that arrived primary health centers and control any complication and weight of females after C. operation.

**Key words:** Abdominal obesity, caesarean section, waist circumference

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Introduction:

Females that obese associated with risk of gestation complications and delivery difficulties and after delivery problems like infection, bleeding and embolism. So increase death rate of females that have obesity. So obesity in females associated with age, learning, money income and marriage state \(^{(1)}\). WHO classification of obesity according of BMI of females is highly suggested. There is strong relation between obesity and complication after C operation and increase in death rate \(^{(2)}\). According to WHO the BMI classified as the following obesity > 30kg/m², overweight 25-29.9 kg/m², normal 18.5 - 24.9 kg/m² \(^{(3)}\). Also body fat considered the main risk factors of obesity, WC represented the good measurement of fat of abdomen with take in mind the correlation to height \(^{(4)}\). Obesity is storage of an excess of body fat frequently resulting in a significant impairment to health. Abdominal obesity, also known as central obesity, is when excessive abdominal fat around the stomach and abdomen has built up to the extent that it is likely to have a negative impact on health \(^{(5)}\). Obesity in center of abdomen and increase waist-hip relation associated with hyperinsulinemia, resistance of insulin, dyslipidemia, inflammation and thrombus formation also obesity associated with development of DM, while increase muscle build associated with increase insulin action and decrease DM \(^{(5)}\). Caesarean operation had progress high in developed and developing state for different causes. It prevents prenatal death of mothers and no role or benefit for C/S to females and babies if not need the operation. Like other types of operation C/S may associated with temporary and permanent risk factors and complications reach there effect for many years after recent delivery this effect occur on health of females and their babies \(^{(6)}\).

The aim of this work was to understood the effect of Caesarean Section on Body Weight and Waist Circumference among Women in Al Nasiriya City as an important study for Iraqi people.

Method:

Study of cross sectional occurs in hospital (Al Haboobi and Bent Al Huda teaching hospital) in al Nasiriya province. All females came to this hospital for obstetric and gynecological outpatients. **Inclusion standards:** entirely not pregnant females who delivered by caesarean section (before less than one year, 1-5 years and more than 5 years) in comparison with those delivered normally. **Exclusion criteria:**

1. Pregnant women.
3. Women with medical disease like [polycystic ovarian syndrome, hypothyroidism, Cushing syndrome and diabetes mellitus].
4. Women who had less than 3 months' post-partum at the time of data collection.
5. Drug history like [contraceptive drugs, corticosteroid, anti-histamine, anti-conversant, anti-depressant, antipsychotic and psychotropic drugs].
Anthropometric measure:
A-Weight measurement, B- Height measurements, C- Waist circumference measurement\(^{(7)}\).

BMI designed by procedure\(^{(8)}\): BMI = weight (kg) / height (m)\(^2\). According to WHO BMI classified into following (low weight < 18 kg/m\(^2\), normal 18.5-24.9 kg/m\(^2\), overweight 25-29.9 kg/m\(^2\) and obesity > 30 kg/m\(^2\))\(^{(9)}\). No any cutoff points for WC for Iraqis peoples so used usual WC of WHO > 88 cm for women is measured as pointer of danger factors\(^{(9)}\). Statistical study: Statistical analysis done by SPSS 22 calculated mean and SD with percentage and frequency. Chi square and Fishers exact use for revealed association between categorical variables, significant association when P-value less than 0.05.

Results:

*Table (4-1): Obstetric history of the participant women*

<table>
<thead>
<tr>
<th>Variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>169</td>
<td>33.8</td>
</tr>
<tr>
<td>3</td>
<td>99</td>
<td>19.8</td>
</tr>
<tr>
<td>≥ 4</td>
<td>232</td>
<td>46.4</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal</td>
<td>250</td>
<td>50.0</td>
</tr>
<tr>
<td>Cesarean section</td>
<td>250</td>
<td>50.0</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>Duration from last delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>13</td>
<td>2.6</td>
</tr>
<tr>
<td>1-5</td>
<td>398</td>
<td>79.6</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>89</td>
<td>17.8</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>100</td>
</tr>
</tbody>
</table>

This table shows the obstetric history of the participant women, around half of the women 46.4% were para four and more, half of the women had normal vaginal delivery and majority of them 79.6% had (1-5) year’s period since a last delivery.
Table (4-2): Body mass index and waist circumference of the participant women.

<table>
<thead>
<tr>
<th>Variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI (mean ± SD 29.5±4.6 kg/m²)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Normal</td>
<td>86</td>
<td>17.2</td>
</tr>
<tr>
<td>Overweight</td>
<td>167</td>
<td>33.4</td>
</tr>
<tr>
<td>Obese</td>
<td>244</td>
<td>48.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>500</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>vaginal delivery</th>
<th>c/s</th>
<th>(x^2)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>2</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>67</td>
<td>26.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>105</td>
<td>42.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>76</td>
<td>30.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>250</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>vaginal delivery</th>
<th>c/s</th>
<th>(x^2)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waist circumference (mean ± SD 91.8±9.8 cm)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\leq 88)</td>
<td>178</td>
<td>35.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(&gt;88)</td>
<td>322</td>
<td>64.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>500</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table shows that the mean BMI of the participant women was 29.5±4.6 kg/m²; 33.4% were overweight and 48.8% were obese. The mean waist circumference of the participant women was 91.8±9.8 cm; more than half of them (64.4%) had a waist circumference >88 cm.

Table (4-3): Distribution of BMI and waist circumference of participant women according to their mode of delivery

<table>
<thead>
<tr>
<th>Variables</th>
<th>vaginal delivery</th>
<th>c/s</th>
<th>(x^2)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>2</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>67</td>
<td>26.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>105</td>
<td>42.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>76</td>
<td>30.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>250</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>vaginal delivery</th>
<th>c/s</th>
<th>(x^2)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waist circumference</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\leq 88)</td>
<td>159</td>
<td>63.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(&gt;88)</td>
<td>91</td>
<td>36.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>250</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This table shows the distribution of BMI and waist circumference of the participant women according to their mode of delivery, it was observed that, there was significant association the mode of delivery and each of BMI and waist circumferences.

*Table (4-4): Distribution of abdominal obesity according to the number and duration from last cesarean section.*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Waist circumference ≤ 88</th>
<th>Waist circumference &gt; 88</th>
<th>x²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td><strong>No. of cesarean section</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>70.0</td>
<td>34</td>
<td>14.7</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>25.0</td>
<td>47</td>
<td>20.4</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>5.0</td>
<td>58</td>
<td>25.2</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0.0</td>
<td>87</td>
<td>37.8</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0.0</td>
<td>4</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
<td><strong>230</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td><strong>Duration from last Cesarean section</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>0</td>
<td>0.0</td>
<td>6</td>
<td>2.6</td>
</tr>
<tr>
<td>1-5 years</td>
<td>16</td>
<td>80.0</td>
<td>182</td>
<td>79.1</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>4</td>
<td>20.0</td>
<td>42</td>
<td>18.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
<td><strong>230</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

This table shows the distribution of waist circumference according to the number of cesarean section and duration; It was observed that, there was significant association between waist circumference and number of CS, but no significant association between CS and its duration.
### Table (4-5): Distribution of waist circumference and BMI according to the type of cesarean section.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Elective cesarean section</th>
<th>Emergency cesarean section</th>
<th>( x^2 )</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Waist circumference</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \leq 88 ) cm</td>
<td>14</td>
<td>7.3</td>
<td>6</td>
<td>10.1</td>
</tr>
<tr>
<td>( &gt;88 ) cm</td>
<td>177</td>
<td>92.7</td>
<td>53</td>
<td>89.9</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>1</td>
<td>0.6</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Normal</td>
<td>11</td>
<td>5.8</td>
<td>8</td>
<td>13.6</td>
</tr>
<tr>
<td>Overweight</td>
<td>42</td>
<td>21.9</td>
<td>20</td>
<td>33.9</td>
</tr>
<tr>
<td>Obese</td>
<td>137</td>
<td>71.7</td>
<td>31</td>
<td>52.5</td>
</tr>
<tr>
<td>Total</td>
<td>191</td>
<td>100</td>
<td>59</td>
<td>100</td>
</tr>
</tbody>
</table>

This table shows the distribution of waist circumference and BMI according to the type of cesarean section; It was observed that, there was significant association between type of cesarean section and waist circumference, rate of abdominal obesity was 92.7% among women with elective CS as compared to women emergency cesarean section 89.9% and there was significant association with BMI. 72% females that undergo C/S had obesity while 53% of females undergo urgent C/S had obesity.

**Discussion:**

Obesity considered the main problem in community in all world. Obesity represented the fifth cause of death globally. About million persons die yearly as results of obesity, as well as obesity is major risk factor of IHD 23%, DM 44% and some types of cancer 7-41\(^{(10)}\). Some articles stated that obesity record high level in developing countries and in same time, no any decrease in obesity in developed countries over previous years. As example; in Africa increase in obese person at previous period and still increase recently\(^{(11)}\). Internationally 300 million persons recognized as obese and 1 billion as overweight as the last report of WHO. Females is more common to have obesity than male especially in child bearing age more complication of obesity in females is difficulty of gestation and also early abortion\(^{(12)}\). In the present study, the prevalence of obesity was 48.8%, overweight 33.4% and abdominal obesity was 64.4\%. This prevalence was greater than that documented in KSA, which found prevalence of general obesity was 33.8% and abdominal obesity was 25.1% among Saudi Women of Reproductive Age in Jeddah City \(^{(13)}\). Also prevalence of obesity and overweight in current study was higher than that reported in Jordan, in Jorden study showed 39% of females with obesity and 30% of them overweight\(^{(14)}\). The findings of the present study regarding the prevalence of general obesity, over weight and abdominal obesity was higher than the findings that
reported in Iran. The general obesity and overweight were seen in 30.0% and 28.2% and abdominal obesity was 54.4% \((P=0.001)\) \(^{(15)}\). In the present study, there was significant association between the mode of delivery and each of BMI and waist circumference. Prevalence of overweight 42.0% in women who had history of NVD compare 24.8% in those with Caesarean Section, 67.2% of women who had history of CS were obese compare 30.4% with those delivered normally \((p\text{ value}< 0.001)\). Therefore, the obesity was high among women with CS. There were significant changes in the in the body weight and waist among women after delivery by CS. Regarding the prevalence of abdominal obesity was 36.4 \% in women (NVD) compare to those with CS was 92\% \((p\text{ value was}< 0.001)\). This revealed that CS had more risk for abdominal obesity, the findings reported in a previous study in Baghdad city in Iraq in 2014, prevalence of overweight and obesity was 36.2\%, 11.9\% in women with history of NVD and in those with CS was 63.8\% over weight and 88.1\% obese \([p\text{ value was }<0.001]\). Our findings is in agreement with Kominarek's et al., (2010) in US who found that cesarean section increased significantly the different classes of obesity. Similarly, Tosson and Al-hussaimi in Egypt, (2005) as well as Perlow et al., (1992) suggested that BMI was significantly related to the mode of delivery \(^{(16)}\). Analysis of results of this study can be considered as a warning sign for both women but higher in those with history of caesarean section regarding the burden of abdominal obesity as a risk factor for chronic diseases, decreasing the quality of life, and death at an earlier age and there was no explanation for developing abdominal obesity, increment in the body weight after caesarean section \(^{(17)}\). There was significant association between waist circumference and number of cesarean section \((p<0.05)\) this may be due to accumulated effect of CS on the abdominal adipose tissue so increase number of CS lead to more destruction to adipose tissue and decreased tissue elasticity which lead to hyper proliferation of adipocytes. There was no significant association between waist circumference and duration after caesarean section \((p>0.05)\). Most previous studies evaluated the association between maternal obesity and CS (maternal obesity is a risk factor for cesarean delivery) in present study the aim to study the association between CS and AO. The findings reported in previous study in sub-Saharan Africa there was association between obesity and number of CS \((p<0.05)\) \(^{(18)}\). In present study there was significant association between type of cesarean section and waist circumference, the rate of abdominal obesity in elective CS was 93.2\% as compared to women with emergency cesarean section 89.8\% and there was also significant association with BMI. The prevalence of obesity was high among women with elective cesarean section 71.1\% as compared to women with emergency cesarean section 52.5\% also no similar study could be found to compare the present finding, the rising numbers of CS are partly due to the rising number of women requesting an elective cesarean section \(^{(18)}\).

**Conclusions**

Abdominal, overweight and obesity were common among women in reproductive age group in AL Nasiriya city. Distribution of abdominal obesity was higher in women who had history of CS than NVD and it increased with increasing the number of caesarean section.
References:


