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Factors Associated With Method of Pregnant Women Delivery in Nablus Region in West Bank

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Abstract

Introduction: The factors that are associated with increase in Cesarean delivery (CS) and instrumental vaginal delivery (IVD) were not studied among Palestinian women before.

Aims: To determine the factors that are associated with CS and IVD 2) To study the relationship between birth weight, weight gain during pregnancy and pre-gestational BMI and risk of CS and IVD.

Methods: The study involved 387 pregnant women who were recruited from Palestinian Ministry of Health outpatient clinics during 2017-2018. Data were collected using a self-administered questionnaire that included questions about demographic data and birth outcomes. Data regarding anthropometric height and weight to calculate the body mass index (BMI) and weight gain each trimester were collected from the women files. Data was analyzed by SPSS.

Results: In this study, 29.7% of the pregnant women had CS and 18.2% had IVD. Being overweight almost doubled the risk CS and IVD significantly ($p< 0.05$) and having excessive weight gain during pregnancy almost double the risk of IVD (0.08). Having a baby less than 2.5 Kg reduced the risk of IVD ($p< 0.05$), but macrosemia was not related to way of delivery.

Conclusion: Having high BMI and weight gain during pregnancy increase the risk of CS and IVD.

Introduction

The rate of performing cesarean section (CS) has increased in many countries in developed and developing countries [1]. CS is associated with risks for both delivering mother and her newborn infant; in mothers infection, hemorrhage and even death could happen [2] and new born infants may suffer from future metabolic and respiratory health issues [3], this in addition to associated financial burden [4]. In a study among pregnant Palestinian women in between the years 2015-2016, the prevalence of CS among 5 Palestinian hospitals ranged from 5.8% to 22.6% among primiparous women and 4.8% to 13.1% among parous women [5] indicating high prevalence of CS in some settings. In a study performed on Palestinian women from Jenin, high weight during pregnancy, edema, anemia, bleeding, high blood pressure during pregnancy were among many factors that were linked to having CS [6].

Instrumental vaginal delivery (IVD) refers to the application of forceps and vacuum device to assist the mother in vaginal delivery of infant [7], 5-20% of infants in developed countries will be delivered by instrumental (operative vaginal delivery) [8], this form of delivery increase CS and is associated with higher morbidity for delivering mothers [9]. In developing countries the rate of this form of delivery is less [7] .Factors that increase this form of delivery include higher maternal BMI, epidural analgesia, and high birth weight [7,10]. Weight gain during pregnancy is a health issue in developed [11] countries and developing countries [12], with consequent increase in birth weight [13]. The prevalence of obesity in newly married women in two villages in Hebron was 16% in recent study [14]. Maternal obesity, pregnancy weight gain and macrosemia are all factors that are related to increase in the prevalence of cesarean section [7,10].

Nablus is one of the largest cities in the West Bank. It is considered one of the most commercial and economical centers and has many hospitals, governmental primary healthcare centers and a big university and other services that often used by other residents of the west bank [15]. The goal of this study was to identify the major factors that contribute to use of CS and IVD among pregnant women in Nablus and understand how much birth weight, pre-gestational BMI and weight gain during contribute to use of CS and IVD.

Methods

Study Sample

387 pregnant women were randomly selected using stratified proportional sampling method from women who were registered for antenatal care at major in Ministry of Health (MOH) four clinics (Balata, Al Markazi, Al Makhafia and Raas Alaein clinics) in the city of Nablus for the year 2017 as per Table 1. Women who use antenatal care in UNRWA clinics which primarily serve refugee women were excluded from the study.

Categories	NVD	Instrumental delivery	CS	Chi-square	p-value
Age					
17-25 y	37 (45.1%)	19 (23.2%)	26 (31.7%)	10.8	0.094
26-32 y	122 (58.4%)	28 (13.4%)	59 (28.2%)		
33-41 y	31 (43.1%)	17 (23.6%)	24 (33.3%)		
Above 41 y	7 (43.8%)	5 (43.8%)	4 (25%)		
Place of residence					
Village	52 (52.5%)	15 (15.2%)	32 (32.3%)	2.3	0.69
Camp	18 (46.2%)	10 (25.6%)	11 (28.2%)		
City	127 (52.7%)	44 (18.3%)	70 (29.0%)		
Occupation					
Yes	37 (42.5%)	21 (24.1%)	29 (33.3%)	4.6	0.1
No	160 (54.8%)	48 (16.4%)	84 (28.8%)		
Education					
Less than Tawjihi	30 (46.2%)	9 (13.8%)	26 (40.0%)	7	0.53
Tawjihi	62 (55.4%)	22 (19.6%)	28 (25%)		
Diploma	47 (52.2%)	16 (17.8%)	27 (30.0%)		
Bachelors	54 (50.5%)	21 (19.6%)	32 (29,9%)		
Income					
Less than 1000 shikel	1 (25%)	2 (50%)	1 (25 %)	5.3	0.26
1000-4000 shikel	134 (54%)	46 (18.5%)	68 (27.4%)		
More than 4000 shikel	61 (48.8%)	20 (16.0%)	44 (35.2%)		
Gravida					
1	60 (55.0%)	17 (15.6%)	32 (29.4%)	7.8	0.46
2	31 (41.3%)	18 (24.0%)	26 (34.7%)		
3	29 (53.7%)	10 (18.5%)	15 (27.8%)		
4	29 (58.0%)	29 (58.0%)	10 (20.0%)		
4 or more	48 (52.7%)	48 (52.7%)	30 (33%)		
Para					
No one	70 (52.6%)	22 (16.5%)	41 (30.8%)	4	0.6
3-Jan	88 (50.9%)	33 (19.1%)	52 (30.1%)		
6-Apr	28 (50.9%)	9 (16.4%)	18 (32.7%)		
More than 6	11 (61.1%)	5 (27.8%)	2 (11.6%)		
Birth weight					
<2500 g	31 (54.4%)	2 (3.5%)	24 (42.1%)	13.6	0.009
2500 g-4 Kg	151 (53.0%)	57 (20.0%)	77 (27.0%)		
> 4 Kg	15 (40.5%)	10 (27%)	12 (32.4%)		

Anemia					
No	133 (55.6%)	40 (16.7%	66 (27.6%)	3.49	0.17
Yes	64 (45.7%)	29 (20.7%)	47 (33.6%)		
Smoking					
No	130 (55.6%)	37 (15.8%)	67 (28.6%)	3.72	0.16
Yes	67 (46.2%)	32 (22.1%)	46 (31.7%)		
Weight gain					
Inadequate	95 (57.6%)	24 (14.5%)	46 (27.9%)	7.4	0.12
Normal	71 (51.8%)	25 (18.2%)	41 (29.9%)		
Excessive	31 (40.3%)	20 (26.0%)	26 (33.8%)		
BMI (Kg/m2)					
<18.5	5 (41.7%)	3 (25.0%)	4 (33.3%)	7.81	0.25
18.5-24.9	114 (57.6%)	29 (14.6%)	55 (27.8%)		
25-29.9	42 (42.0%)	23 (23.0%)	35 (35%)		
> 30	36 (52.2%)	14 (20.3%)	19 (27.5%)		

Table 1: Summary of study variable by method of delivery

Data Collection

Diets, obstetric history, physical activity performance, knowledge about weight gain during pregnancy information were obtained by a self-administered questionnaire. BMI was calculated using height and weight, also weight gain each trimester were collected from the women' files using data collection form. Questionnaire and data collection forms were based on previous literature with details published elsewhere [16]. Validity and reliability were checked by experts. 5% of the sample size (n=19) were part of pilot study with cronbach alpha was computed (0.90, 95% CI (0.82-0.95).

Ethics Approval and Consent to Participate

The study was approved by the Institutional review board (IRB) committee from An – Najah National University and by MOH that permitted access to antenatal clinics and hospitals. In addition, a signed written consent form was used to ensure the conformity of pregnant women participating in the study.

Field work

This project was carried out from the end of September 2017 to the end of July 2018 during the workdays of MOH from Sunday to Thursday. Five visits were made to each clinic: first, the purpose of the study was explained to pregnant women who met the inclusion criteria, then height and weight were measured. Second, third and fourth visits were held at the end of each trimester to measure the weight using the file registration number to avoid doubling of any women. Last visit maternal and fetal outcomes data were collected from files and registration book of hospitals where delivery happened to identify the method of delivery.

Statistical Methods and Data Analysis

Chi-square was used to identify the potential differences in the proportions of each form of delivery according to age, occupation, education, place of residence, BMI, birth weight, weight gain during, para and gravida subcategories. Moreover, multinomial logistic regression models were used to assess whether birth weight categories, BMI categories and weight gain categories were significant predictors of IVD versus NVD or CS versus NVD using age, education, occupation in the models. P values that are less than 0.05 were considered significant.

Results

Total of 380 women were included in the analysis, majority of women in our study (55%) were 26-32 y, and were overweight (26.6%) or with normal BMI (52%). Also, many women had Bachelor's degree (28.2%) or college degree (23.7%). Most women in the study (63%) were residents of the same city of Nablus, whereas 26% were from villages and 10% were from refugee camps. Only 23% of the study participants reported that they work.

Table 1 provides description of the study participants across various birth delivery modes in relation to study variables. IVD was most common among women> 41 y, whereas the CS was more common in the age group 33-41 y relative to the other groups, but this did not reach to statistical significance. Place of residence, occupation, educational level, anemia, smoking and income were not significant factors in relation to delivery mode. Moreover, gravida and para were not significant factors in relation to mode of delivery. In regards to birth weight, infants with smaller weights and larger weights tended to be more likely to be delivered through CS, whereas IVD was more often used in delivery of babies who are> 4 Kg. Both CS and IVD were more common among women who gained excessive amount of weight, whereas BMI was not significant in relation to mode of delivery.

Table 2 shows multinomial logistic regression models that were used to study the relationship between BMI, weight gain and birth weight in relation to mode of delivery adjusting for factors including; age, education, occupation. Being overweight almost doubled the risk CS and IVD significantly ($p< 0.05$) and having excessive weight gain during pregnancy almost double the risk of IVD (0.08). Having a baby less than 2.5 Kg reduced the risk of IVD ($p< 0.05$), but macrosemia was not related to way of delivery.

Variable	IVD versus NVD	p-value	CS versus NVD	p-value
BMI (Kg/m²)				
< 18.5	2.6 (0.6, 11.6)	0.23	1.6 (0.4, 6.2)	0.52
25-29.9	2.3 (1.2, 4.6)	0.013	1.8 (1.0, 3.1)	0.05
> 30	1.5 (0.7, 3.4)	0.29	1.0 (0.5, 2.1)	
18.5-24.9				
Weight gain				
Inadequate	0.75 (0.39, 1.44)	0.39	0.85 (0.50, 1.44)	0.55
Excessive	1.93 (0.92, 4.01)	0.08	1.47 (0.76, 2.82)	0.25
Normal				
Birth weight				
< 2500 mg	0.2 (0.04, 0.71)	0.02	1.41 (0.76, 2.62)	0.27
> 4 Kg	1.6 (0.67, 3.87)	0.29	1.47 (0.65, 3.36)	0.36
2500-4 Kg				

Table 2: Multinomial Logistic Regression that summarizes the association of weight gain, BMI and birth weight with method of delivery

Discussion

In this study, 29.7% of the pregnant women had CS and 18.2% had IVD. This sample was more representative of women from the same city of Nablus and villages around, and few of the study participants were from surrounding refugee camps. CS and IVD were more common among older women, working mothers. On the other hand, CS and IVD were more common among women who had infant with large birth weight, whereas having low birth weight was associated with having higher rate of CS in unadjusted models. In fully adjusted model having a small infant reduced the risk of IVD and being overweight increased the risk of CS.

The value reported for CS in our study was 29.1% which is much higher that what was reported previously in other cities in Palestine which reported 9.1% of emergency CS not scheduled [5]. The high incidence of CS rate in the current study may be due to sample size limitation and to the percentage included both emergency CS and scheduled CS. It is important to mention that WHO the incidence rate of CS section should not exceed 10-15%, [17]. while comparing the rate from this study with the rate from countries with high CS rate such as China, they reported (34.9%) rate of CS delivery, while in Iran [18] 48% the rate from both studies still much higher than the WHO suggested rate. Number of previous pregnancies and deliveries the mother had previously was not a significant factor in our study. Which is similar to findings from Seri Lanka which reported that the maternal age, delivery time, infant's weight and infant shoulder-length have a statistically significant association with the type of delivery not the number of pregnancy or delivery [19].

Occupation was a significant predictor of having CS and IVD both in unadjusted and adjusted models which was significant $p< 0.05$ (data not shown). Working women seem to be more likely to have CS and IVD. Similar findings were reported in a meta-analysis study conducted among Iranian population they found that higher mothers education level is the most significant factor for CS delivery followed by previous CS delivery and doctor recommendations [18].

Mothers with anemia seems to be at higher risk of having CS and IVD, but this did not reach statistical significant in unadjusted model. In a large scale study included more than 32 thousands pregnant women it was reported that maternal anemia at delivery is a risk factor of CS delivery [20], this was supported by other study conducted at Sudan . But in a study conducted in Korea and included around 26 thousands participants found significant relationship between anemia and single CS delivery in univariate

analysis, but with multivariate analysis the relationship was not significant in single CS delivery but with repeated CS delivery [21], which is consistent with the findings from the current study. It is logical to consider that maternal anemia tended to cause fetal distress and subsequently increase the cesarean section rate. In addition , preexisting iron deficiency anemia in pregnancy has been reported to be associated with adverse pregnancy outcomes such as premature birth and low birth weight [21].

The study reported a significant relationship between presentational BMI and mode of delivery, being overweight and obese double the risk of having CS delivery. However, the literature documented positive associations between overweight obesity with pregnancy and delivery complications; i.e. hypertension, gestational diabetes, increased time of labor, dystocia, and increased risk of cesarean delivery (CS). [22]. A meta-analysis reported as well, positive association between cesarean delivery and overweight, obese women [23]. In US report, in 2014, nearly 4 million births, 32.3% were CS, and nearly 50% were to women who were either overweight (25.6%) or obese (24.8%) before becoming pregnant. Obese women who have a CS experience more adverse peripartum outcomes [24].

The study found significant relationship between excessive gestational weight gain during pregnancy with the mode of delivery. This relationship was documented in a systematic review which pooled the data from 25 pooled cohort studies and 196 670 participants, concluded; magnitude of gestational weight gain were associated with risk for many adverse outcomes including cesarean delivery [25].

Similar to pre-gestational obesity, excessive gestational weight gain is associated with an increasing incidence of maternal and neonatal complications, including hypertensive disorders of pregnancy, fetal macrosomia, and increased cesarean birth rates [26], in recent study conducted in Berlin Germany; obesity and excessive gestational weight gain were the most important predictors of cesarean besides older age in logistic regression model [27].

The current study reported differences in the incidence of CS or IVD delivery according to age groups but the association didn't reach the significant level. Similar trend was reported before [27] but with significant relationship; older mother have significant higher risk of CS delivery. This trend may be explained by the fact that women older than 35 are more likely to be obese, hypertensive, and diabetic, which in turn have an impact on fetal anomalies, Moreover, advanced maternal age increases the risk of spontaneous abortion, pre-term delivery and perinatal bleeding. Which affect the gynecologist decision to perform CS delivery rather than normal delivery [17]. This study is the first study to address the relation between maternal obesity, weight gain during pregnancy and birth weight with method of delivery. We included women from cities, villages and refugee camps. We addressed many factors in our study including smoking, anemia, parity and gravidity.

Study Limitations

Our study is not without limitation including under-representation of refugee camps in UNRWA clinics. Our study is cross sectional in design and so no causal relationship can be inferred. Data were collected as categorical and hence we only tested our hypothesis using multinomial logistic regression analysis. This data was limited to Nablus and its villages and camps, performing studies on larger scale would be very useful.

Conclusion

In summary, in study among representative group of pregnant women from Nablus region MOH clinics, use of CS and IVD was very common especially among older, working mothers, and women with infants who have large size. In fully adjusted models, being overweight and working mother were the most important determinants of having CS and IVD. Although excessive weight gain and having large baby were not sorted out as significant predictors of CS and IVD, more work are needed to clarify the relationship. Nutrition education programs that promote healthy weight and appropriate weigh gain are recommended among Palestinian women in Northern West Bank.

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