



Research Article

RELATION BETWEEN PRENATAL CARE AND THE OUTCOME OF PREGNANCY IN LOW-RISK PREGNANCIES

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Abstract

Introduction: Prenatal care (PNC) is a frequently used health service that has the potential to reduce the incidence of perinatal morbidity and mortality by treating medical conditions, identifying and reducing potential risks, and helping women to address behavioral factors that contribute to poor outcomes. **Aim:** To investigate the association between number of prenatal visits (PNV) and pregnancy outcomes. **Methods:** A prospective cross-sectional study was included all women admitted to Benghazi medical center for delivery over six months. Results: The study included 200 pregnant women, there were 123(61.5%) had adequate care and 77(38.5%) had inadequate care. The mean age of mothers with adequate was higher than age of mothers with inadequate care. Level of education was higher in adequate group than inadequate group. Gravida ≤ 5 of all patients was 81.5% and 18.5% had >5 . Gravida ≤ 5 was 69.3% had adequate care, and 30.7% had inadequate care, while gravid >5 , 27% of them had adequate care and 73% had had inadequate care, this difference was statistically significant. Booking for prenatal care 73.3% booked at 1st trimester, 14.5% at 2nd trimester, 6% at 3rd trimester and 6% not booked at all. Mothers booked at 1st trimester 77.6% of them had adequate care and 22.4% inadequate care, patients booked at 2nd trimester 31% of them and 69% had inadequate care. Patients booked at 3rd all of them had inadequate care, the difference was statistically significant. Mean number of visits in adequate care was higher than mean of inadequate. Early post partum hemorrhage and cervical tear were recorded more in inadequate group. Majority of babies were alive (90%), 9.5% were died. Neonatal death were higher in inadequate group. **Recommendation:** Future research is needed and need to develop a valid and reliable instrument to measure quality of PNC.

Keywords: Prenatal care, Pregnancy, Low risk pregnancies.

INTRODUCTION

Prenatal care refers to performance of accurate principles with the aim of maintaining a healthy pregnancy, and optimal mental and physical health of the mother, child, and families. Research has shown that adequate prenatal care is an effective intervention in improving pregnancy outcomes. Adequate prenatal care provides opportunity for consulting and reducing complications associated with pregnancy and childbirth. A great percentage of maternal and fetal mortality, preterm births, or low-weight births are due to inappropriate and inadequate prenatal care during pregnancy, which could be greatly reduced in childhood and future complications. The overall rate of fetal death was 2.7 in 1000 births in care and 14.1 in 1000 births in no care. In other words, the lack of prenatal care increases the relative risk (RR) of death 3.3 times and that of preterm labor 2 times more.¹ In the 90's, randomised trials have been conducted to compare the standard model of ANC with a new model of care. The new model applied a more cost-efficient-risk-oriented approach emphasizing on actions known to be effective in improving maternal or neonatal outcomes. Promoting the latter strategy, the World Health Organization (WHO) recommends a minimum of four ANC visits for uncomplicated pregnancy. The risk-oriented ANC strategy involves: (i) routine care to all women, (ii) additional care for women with moderately severe diseases and complications, and (iii) specialized obstetrical and neonatal care for women with severe diseases and complications. Various recent studies have assessed ANC utilisation and/or content in developing countries.

However, these studies have seldom included a comparison between low risk and high-risk women. Comparison of ANC utilisation and content by risk level in developed settings has been more frequently studied. Results of these studies demonstrate that women without risk factors use ANC services more frequently than recommended. Such over-utilization is problematic for low-resourced settings. At the same time, these studies show that for a substantial proportion of high-risk women, the utilisation of ANC or the content of care delivered is below the recommended standard.² Prenatal care in the United States is widely accepted as an important public health intervention. The current recommended American Congress of Obstetrics and Gynecology (ACOG) prenatal visit schedule for uncomplicated first pregnancies consists of a visit every 4 weeks until 28 weeks, every 2 weeks until 36 weeks, and weekly until delivery. Historically, back-loading the majority of visits in the third trimester was done to detect maternal signs and symptoms of preeclampsia. However, available data do not show whether this schedule, or any other prenatal visit schedule, is adequate to improve maternal and neonatal outcomes. Many European countries generally have fewer prenatal visits (PNV) with better birth outcomes compared to the United States. For example, the median number of PNV in the United States is 11 compared to 7 in France; yet, the infant mortality rate in France is 3.1/1000 while it is 6.1/1000 in the United States. These numbers suggest more PNV may not necessarily mean better outcomes.³

Aims of the study:

To investigate the association between number of prenatal visits (PNV) and pregnancy outcomes.

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REVIEW OF LITERATURE

Teherah Ashraf-Ganjoei-et-al conducted a cross-sectional study on 210 pregnant women referring to Afzalipour Hospital for their labor, consisting of 140 women with adequate care and 70 with inadequate care. The outcome of pregnancy for mother and newborn was compared between the two groups. Data were analyzed using SPSS software version 15. P value ≤ 0.05 was considered as significant and the power of statistical test was 80%. Findings: The findings indicate that the age of women with inadequate care was lower compared to those receiving adequate care ($p = 0.003$). Furthermore, women with inadequate care had lower education ($p = 0.00007$) and their prenatal care started in more advanced gestational ages ($p = 0.0003$). Neonates born to women with inadequate care tended to have lower birth weights ($p = 0.05$) and higher rates of admission to NICU ($p = 0.02$). Conclusion: Our findings indicate that women with lower age and education received less prenatal care and adequate prenatal care results in better birth weights and decreased rate of admission in NICU⁴.

Yeoh PL et-al carried retrospective study using a multistage sampling technique, at public-funded primary health care clinics. Antenatal utilisation level was assessed using a modified Adequacy of Prenatal Care Utilisation index that measures the timing for initiation of care and observed-to-expected visits ratio. Adequacy of antenatal care content assessed compliance to routine care based on the local guidelines. Results Intensive or "adequate-plus" antenatal care utilisation as defined by the modified index was noted in over half of the low-risk women. On the other hand, there were 26% of the high-risk women without the expected intensive utilisation. Primary- or non-educated high-risk women were less likely to have a higher antenatal care utilisation level compared with tertiary educated ones ($OR = 0.20$, $P = 0.003$). Half of all women had $<80\%$ of the recommended antenatal care content. A higher proportion of high-risk than low-risk women scored $<80\%$ of the routine care content ($p < 0.015$). The majority of the additional laboratory tests were performed on high-risk women. Provision of antenatal education showed comparatively poor compliance to guidelines, more than half of the antenatal advice topics assessed were rarely provided to the women. High-risk women were associated with a higher prevalence of adverse pregnancy outcome. They-concluded that, there was disproportionate utilisation of antenatal care according to risk level of pregnancy indicates the need for better scheduling of care. The risk-oriented approach often results in a tendency to focus on the risk conditions of the women. Training interventions are recommended to improve communication and to help healthcare professionals understand the priorities of the women. Further studies are required to assess the reason for disproportionate utilisation of antenatal care according to risk level and how delivery of antenatal advice can be improved, reviewing both user and provider perspectives.⁵

R S Mc Duffie Jr et-al conducted-randomized controlled trial to teste the hypothesis that there are no significant increases in adverse perinatal outcomes when low-risk women are seen in a prenatal care visit schedule of fewer visits than routinely advised. A total of 2764 pregnant women, judged to be at low risk of adverse perinatal outcomes. Interventions: Following risk assessment, participants were randomly assigned to an experimental schedule (nine visits) or a control schedule (14

visits) with additional visits as indicated or as desired by the patient. Main outcome measures: Preterm delivery, preeclampsia, cesarean delivery, low birth weight and patient's satisfaction with care. Results: On average, there were 2.7 fewer visits observed in the experimental group than in the control group. There were no significant increases in the main outcomes of the experimental group; preterm delivery (relative risk [RR], 1.08; 95% confidence interval [CI], 0.92 to 1.27; $P = .19$), preeclampsia (RR, 0.94; 95% CI, 0.78 to 1.14, $P = .74$), cesarean delivery (RR, 1.04; 95% CI, 0.93 to 1.17; $P = .25$), and low birth weight (RR, 0.94; 95% CI, 0.78 to 1.12; $P = .76$). There were no differences between the two groups in patients' satisfaction with quality of prenatal care. Conclusion: In this study, good perinatal outcomes and patient satisfaction were maintained when the prenatal visit schedule proposed by the Expert Panel on the Content of Prenatal Care was observed.⁶

Fatma Yousef Ziyu et al conducted study to find out the relation between prenatal care (PNC) and pregnancy outcome. Other factors affecting pregnancy outcome of the mothers delivered at El-Jamahiriya hospital (parity, education, maternal age). **Subjects and method:** A retrospective cohort study of women who delivered at Al-Jamahiriya hospital was used. It included all delivered women admitted to the post -natal and post- operative wards at the hospital in 2007. The sample size was 300 delivered women. Interview questionnaires were used to collect data and PNC record. **Results:** The study found that 47.3% of the mothers were aged 20-29, and 66.7% married at 20-29years. About 94% of mothers attending PNC clinic; 73% of them at or before 16 weeks of gestation, 46.3% have 8 or more visits. They concluded that inadequate prenatal care has negative impacts on the mother and child's health. The present study reported that the fetal outcome was significantly related to socio-economic status. The prenatal care was related significantly to the husband's occupation ($\chi^2 = 39.3$, $P = 0.001$). Also, maternal work significantly related to baby's status at birth where $\chi^2 = 36.7$ & $P = 0.001$.

Parent education is significantly related to fetal outcome were, χ^2

$8 = 15.1$ & $P = 0.04$ and $\chi^2 8 = 15.9$, $P = 0.04$ for maternal and paternal education respectively. Also, the parity was significantly related to delivery of healthy baby where $\chi^2 = 38.3$ and $P = 0.001$.⁷

Ching-Ming Liu et al conducted retrospective study assessed whether the hospital-based continuous prenatal care model at tertiary hospitals reduced the risk of perinatal morbidity and maternal complications in pre-eclampsia patients. Materials and Methods Of 385 pre-eclampsia patients recruited from among 23,665 deliveries, 198 were classified as patients with little or no prenatal care who received traditional, individualized, and physician-based discontinuous prenatal care (community-based model), and 187 were classified as control patients who received tertiary hospital-based continuous prenatal care. Results The effects on perinatal outcome were significantly different between the two groups. The cases in the hospital-based care group were less likely to be associated with preterm delivery, low birth weight, very low birth weight, and intrauterine growth restriction. After adjustment of confounding factors, the factors associated with pregnant women who received little or no prenatal care by individualized physician groups were diastolic blood pressure ≥ 105 mmHg, serum aspartate transaminase level ≥ 150 IU/L,

and low-birth-weight deliveries. This study also demonstrated the dose–response effect of inadequate, intermediate, adequate, and intensive prenatal care status on fetal birth weight and gestational periods (weeks to delivery). Conclusion: The types of prenatal care may be associated with different pregnancy outcomes and neonatal morbidity. Factors associated with inadequate prenatal care may be predictors of pregnancy outcome in pregnant women with pre-eclampsia.⁸

Karine Mendonça Davi Rodrigues et al carried study to analyze the relationship between the number of prenatal care visits and the occurrence of adverse perinatal outcomes in an average city in the state of Minas Gerais, Brazil. Methods: This was a prospective and observational study. The variables analyzed were obtained through a questionnaire administered to postpartum women (between 1 and 48 h postpartum) and information contained in prenatal cards. The pregnant women were classified into three groups: Group I, <3 prenatal care visits; Group II, 3–5 prenatal care visits; and Group III, ≥6 prenatal care visits. Results: Group I had a lower median weight (57.0 vs. 64.0 kg, $p<0.001$), body mass index (22.1 vs. 24.3 kg/m², $p<0.001$), and weight gain (9.0 vs. 12 kg, $p=0.002$) than Group III. The prevalence of admission to the neonatal intensive care unit (11.6 vs. 4.2%, $p=0.02$) and the newborn mortality rate within the first 72 h of life (2.3 vs. 0%, $p<0.001$) were higher in Group I than in Group III. Group II had a higher prevalence of admission to the adult intensive care unit (5.7 vs. 0.6%, $p<0.001$) and a higher newborn mortality rate within the first 72 h of life (1.6% vs. 0%, $p<0.001$) than Group III. CONCLUSIONS: Having ≥6 prenatal care visits was associated with lower rates of admission to the neonatal and adult intensive care unit, as well as a lower newborn mortality rate within the first 72 h of life.⁹

Maureen I Heaman et al conducted study to determine rates of prenatal care utilization in Winnipeg, Manitoba, Canada from 1991 to 2000; to compare two indices of prenatal care utilization in identifying the proportion of the population receiving inadequate prenatal care; to determine the association between inadequate prenatal care and adverse pregnancy outcomes (preterm birth, low birth weight [LBW], and small-for-gestational age [SGA]), using each of the indices; and, to assess whether or not, and to what extent, gestational age modifies this association. **Methods:** They conducted a population-based study of women having a hospital-based singleton live birth from 1991 to 2000 ($N = 80,989$). Data sources consisted of a linked mother-baby database and a physician claims file maintained by Manitoba Health. Rates of inadequate prenatal care was calculated using two indices, the R-GINDEX and the APNCU. Logistic regression analysis was used to determine the association between inadequate prenatal care and adverse pregnancy outcomes. Stratified analysis was then used to determine whether the association between inadequate prenatal care and LBW or SGA differed by gestational age. Results: Rates of inadequate/no prenatal care ranged from 8.3% using APNCU to 8.9% using R-GINDEX. The association between inadequate prenatal care and preterm birth and LBW varied depending on the index used, with adjusted odds ratios (AOR) ranging from 1.0 to 1.3. In contrast, both indices revealed the same strength of association of inadequate prenatal care with SGA (AOR 1.4). Both indices demonstrated heterogeneity (non-uniformity) across gestational age strata, indicating the presence of effect modification by gestational age. **Conclusion:** Selection of a prenatal care utilization index

requires careful consideration of its methodological underpinnings and limitations. The two indices compared in this study revealed different patterns of utilization of prenatal care, and should not be used interchangeably. Use of these indices to study the association between utilization of prenatal care and pregnancy outcomes affected by the duration of pregnancy should be approached cautiously.¹⁰

Haftu A conducted study to assess pregnant women adherence level to antenatal care visit and its effect on perinatal outcome among mothers in Tigray Public Health institutions, 2017. **Results:** The overall adherence level of the women towards to antenatal care visit was 49.9% and incidence of PPH, still birth, early neonatal death, late neonatal death and low birth weight complication was 4.3%, 2.3%, 2.7%, 1.9% and 7.5% respectively. PPH, preterm labor, early neonatal death and LBW complication was reduced by 81.2%, 52%, 61% and 46% respectively among women with complete adherence to ANC visit.¹¹

Theogene Dusingizimana et al conducted study to explore the factors associated with achieving the recommendation, with an emphasis on the distance from household to health facilities. Methods: A geo-referenced cross-sectional study was conducted in Rutsiro district, Western province of Rwanda with 360 randomly selected women. Multiple logistic regression analysis including adjusted odd ratio (aOR) were performed to identify factors associated with achieving the recommended four ANC visits. Results: The majority (65.3%) of women had less than four ANC visits during pregnancy. We found a significant and negative association between distance from household to health facility and achieving the recommended four ANC visits. As the distance increased by 1 km, the odds of achieving the four ANC visits decreased by 19% (aOR = 0.81, $P = 0.024$). The odds of achieving the recommended four ANC visits were nearly two times higher among mothers with secondary education compared with mothers with primary education or less (aOR = 1.90, $P = 0.038$). In addition, mothers who responded that their household members always seek health care, when necessary, had 1.7 times higher odds of achieving four ANC visits compared with those who responded as unable to seek health care (aOR = 1.7, $P = 0.041$). Furthermore, mothers from poor households had 2.1 times lower odds of achieving four ANC visits than mothers from slightly better-off households (aOR = 2.1, $P = 0.028$). Conclusions: Findings from the present study suggest that, in Rutsiro district, travel distance to health facility, coupled with socio-economic constraints, including low education and poverty can make it difficult for pregnant women to achieve the recommended ANC regimen. Innovative strategies are needed to decrease distance by bringing ANC services closer to pregnant women and to enhance ANC seeking behaviour. Interventions should also focus on supporting women to attain at least secondary education level as well as to improve the household socioeconomic status of pregnant women, with a particular focus on women from poor households.¹²

METHODOLOGY

Study Design

Type of study: A prospective cross-sectional study was include all women admitted to Benghazi medical center for delivery over six months (from 1st of-June to 30th of Nov.2022)

at obstetric Gynecology department at (Benghazi Medical Center (BMC))

Procedure:

Full medical and obstetric history was taken from all patients. Data as demographics, relevant obstetric data. Maternal outcome and neonatal outcome were collected using data recording sheets. Patients with diabetes, hypertension, epilepsy or any systemic disease will be excluded from the study. The number of prenatal cares for each person were determined and women was categorized as either receiving adequate care or inadequate care (defined as less than 5 visits for gestational ages of less than 37 weeks or less than 8 visits for gestational ages of 37 weeks or beyond) .¹³

Data collection: All needed date was collected in Performa in appendix I.

Data Analysis

Data was analyzed using (SPSS) statistical package of social science program version 23.

The statistical analysis included:

- Descriptive Statistics: Including (Mean value, Standard deviation, Number and Percentage.
- Inferential Statistics: was used when needed as t- test, Chi-square and Fisher exact test ,P-value was considered significant when ≤ 0.05 .

Data was presented in form of tables and figures, where the figures were done by Microsoft Excel 2010.

RESULTS

Table 1. Demographic characteristics of patients

Variable	Adequacy of care		Total	P value
	Adequate	Inadequate		
Age	28.5±7	32.3±6.3	29.9±7	0.000*
Nationality				
Libyan	97(63.8%)	55(36.2%)	152(76%)	0.231
Non-Libyan	26(54.2%)	22(45.8%)	48(24%)	
Address				
Benghazi	86(62.3%)	52(37.7%)	138(69%)	0.723
Out-side Benghazi	37(59.7%)	25(40.3%)	62(31%)	
Maternal Education				
Elementary	3(14.3%)	18(85.7%)	21(10.5%)	0.0001*
Secondary	53(71.6%)	21(28.4%)	74(37%)	
University	67(63.8%)	38(36.2%)	105(52.5%)	
Maternal Occupation				
Yes	42(68.9%)	19(31.1%)	61(30.5%)	0.157
No	81(58.3%)	58(41.7%)	139(69.5%)	

*Significant

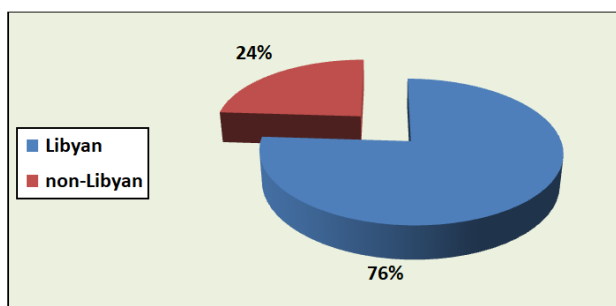


Fig.1. Distribution of patients according to nationality

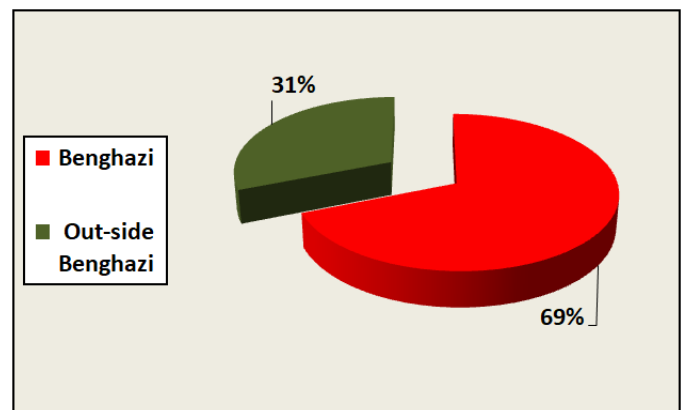


Fig.2. Distribution of patients according to address

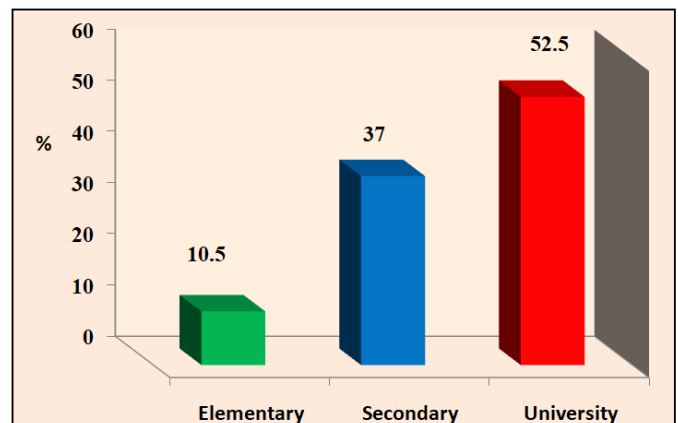


Fig.3. Distribution of patients according to level of education

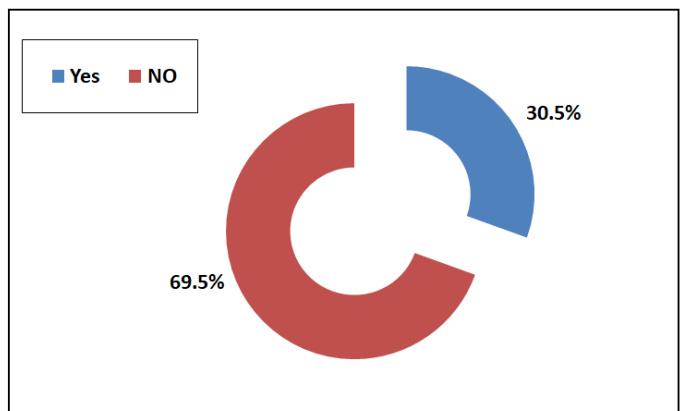


Fig.4. Distribution of patients according to occupation

Table 2. Past obstetric history

Variable	Adequacy of care		Total	P value
	Adequate	Inadequate		
	123(61.5%)	77(38.5%)		
Obstetric history				
Gravida				
≤ 5	113(69.3%)	50(30.7%)	163(81.5%)	0.0001*
>5	10(27%)	27(73%)	37(18.5%)	
Para				
Nuli Para	48(84.2%)	9(15.8%)	57(28.5%)	0.0001*
1-5	72(56.7%)	55(43.3%)	127(63.5%)	
>5	3(18.8%)	13(81.2%)	16(8%)	
Abortion				
Yes	21(43.8%)	27(56.3%)	48(24%)	0.004*
No	102(67.1%)	50(32.9%)	152(76%)	
Mode of previous delivery				
NVD	47(47.5%)	52(52.5%)	99(69.2%)	0.198
C/S	15(65.2%)	8(34.8%)	23(16.1%)	
C/S	13(61.9%)	8(38.1%)	21(14.7%)	
Both				

*Significant

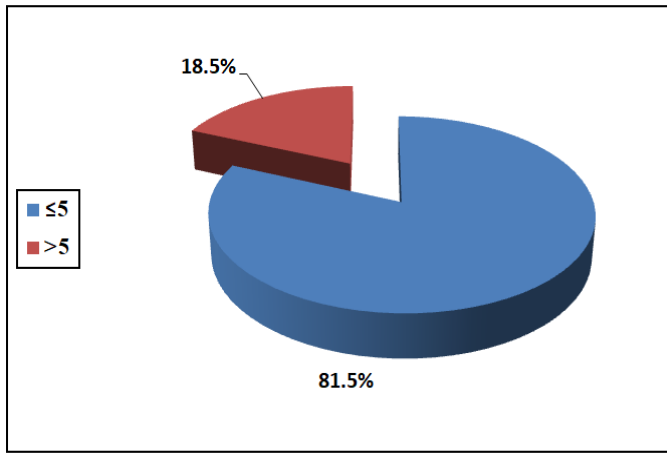


Fig.5. Distribution of patients according to gravidity

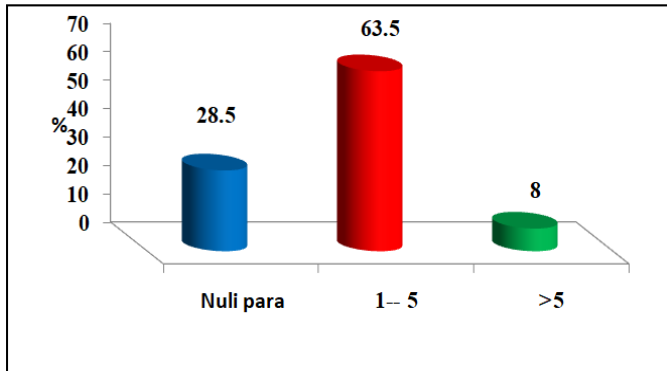


Fig.6. Distribution of patients according to parity

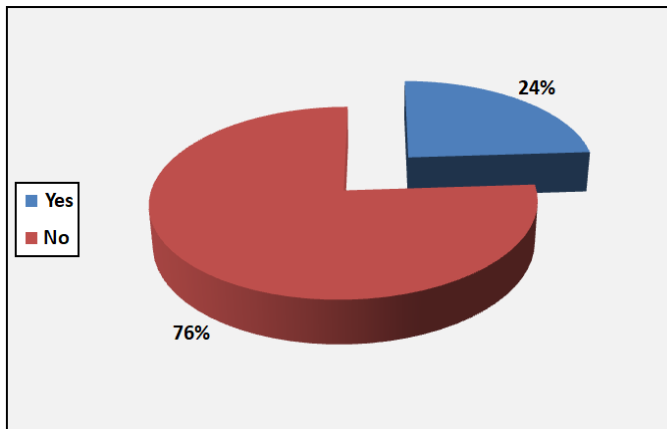


Fig.7. Distribution of patients according to history of abortion

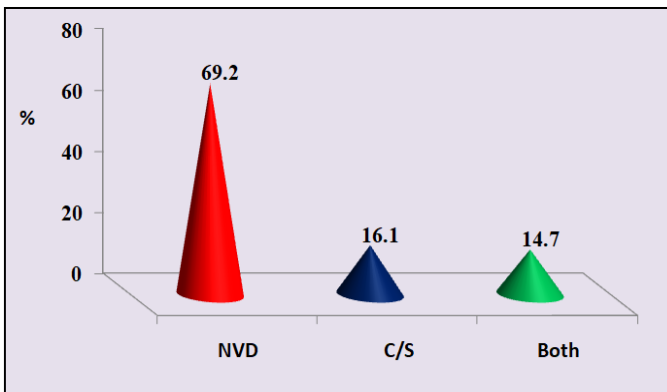


Fig.8. Mode of previous delivery

Table 3. Present Obstetrics history of patients.

Variable	Adequacy of care		Total	P value
	Adequate 123(61.5%)	Inadequate 77(38.5%)		
Onset of Prenatal Care				
1 st trimester	114(77.6%)	33(22.4%)	147(73.5%)	0.0001*
2 nd trimester	9(31%)	20(69%)	29(14.5%)	
3 rd trimester	0	12(100)	12(6%)	
Not booking	0	12(100)	12(6%)	
Number of visit	8.7±1.3	4±2.5	6.9±2.9	0.0001*
Number of USS	8.5±1.6	4±2.5	6.8±2.9	0.0001*
Type of care				
Privet	85(80.2%)	21(19.8%)	106(53%)	0.0001*
Public	38(46.3%)	44(53.7%)	82(41%)	
No	0	12(100%)	12(6%)	
Vitamin intake	(119(69.2%)	53(30.8%)	172(86%)	0.0001*
Folic acid intake	116(73.4%)	42(26.6%)	158(79%)	0.0001*
Iron intake	64(79%)	17(21%)	81(40.5%)	0.0001*
Gestational age at delivery				
Preterm	13(56.5%)	10(43.5%)	23(11.5%)	0.602
Term	101(60.8%)	65(39.2%)	166(83%)	0.673
Post-date	8(88.9%)	1(11.1%)	9(4.5%)	0.084
Post-term	3(75%)	1(25%)	4(2%)	0.575

*Significant

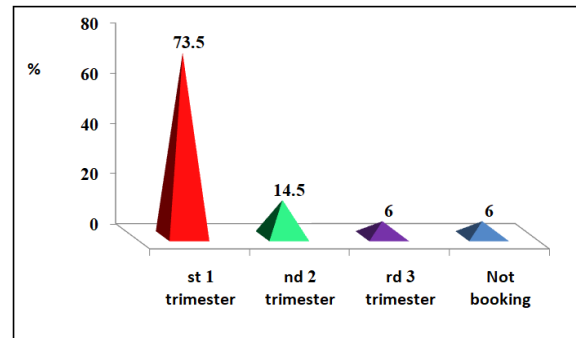


Fig.9. Onset of Prenatal Care

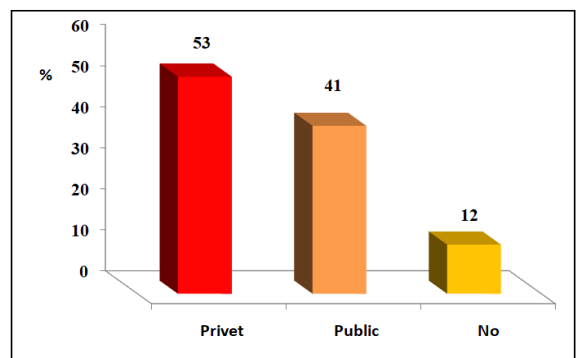


Fig.10. Type of care

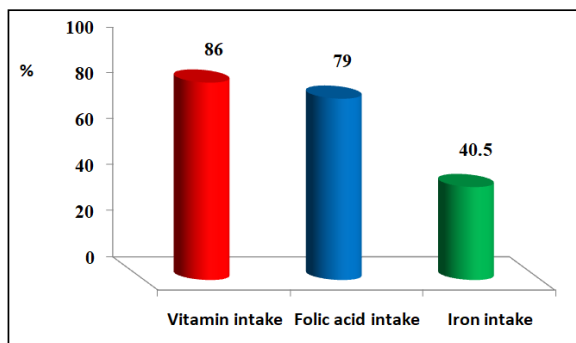


Fig.11. Intake of tonics

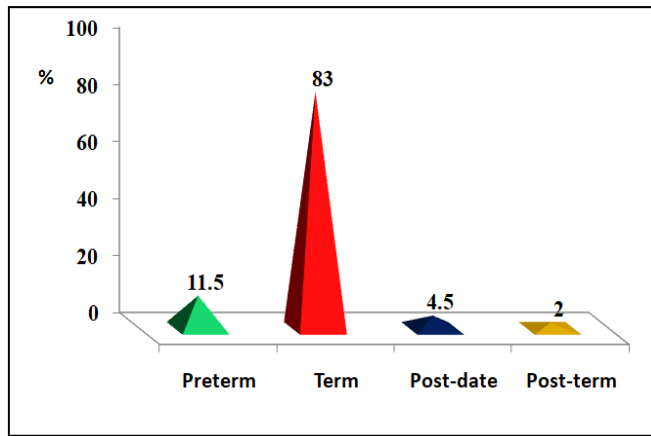


Fig.12. Gestational age at delivery

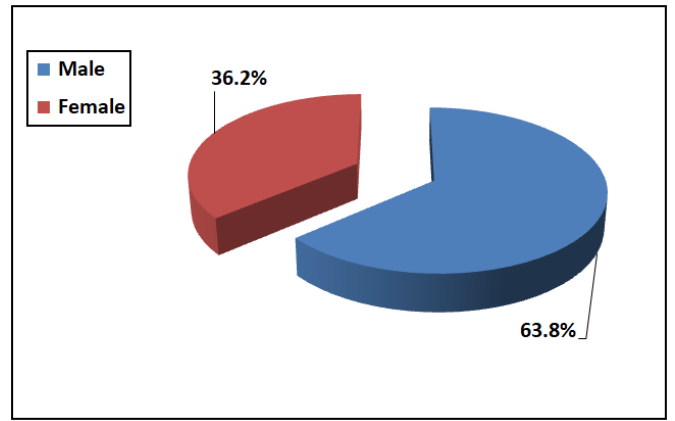


Fig.15. Sex of infant

Table 4. Comparison of outcome of pregnancy between adequate and inadequate care group

Outcome of Pregnancy	Adequacy of care (Number/Percent)		Total	P-value
	Adequate 123 (61.5%)	Inadequate 77(38.5%)		
Mode of Delivery				
C/S	10(66.7%)	5(33.3%)	15(7.5%)	0.906
NVD	103(60.9%)	66(39.1%)	169(84.5%)	
PTND	10(62.5%)	6(37.5%)	16(8%)	
Occurrence of pre-eclampsia	6(50%)	6(50%)	12(6%)	0.389
Early postpartum hemorrhage	19(48.7%)	20(51.3%)	39(19.5%)	0.067
Gestational diabetes	1(100)	0	1(0.5%)	0.378
Cervical tear	6(46.2%)	7(53.8%)	13(6.6%)	
Hysterectomy	0	1(100)	1(0.5%)	

Table 5. Comparison of outcome of babies between adequate and inadequate care group

Outcome of babies	Adequacy of care		Total	P-value
	Adequate 123(61.5%)	Inadequate 77(38.5%)		
Birth Weight	2.9±0.63	2.9±0.68	2.9±0.64	1.000
Sex				
Male	75(59.1%)	52(40.9%)	127(63.8%)	0.288
Female	48(66.7%)	24(33.3%)	72(36.2%)	
Alive	112(62.2%)	68(37.8%)	180(90%)	0.419
Died	11(57.9%)	8(42.1%)	19(9.5%)	
IUFT	0	1(1.3%)	1(0.5%)	
Fresh stillbirth	5(50%)	5(50%)	10(5.2%)	0.458
Respiratory distress	29(67.4%)	14(32.6%)	43(23.8%)	0.390
Need resuscitation	18(64.3%)	10(35.7%)	28(15.5%)	0.775
Septicemia	1(25%)	3(75%)	4(2.2%)	0.125
Fetal injury(Erb,s palsy)	4(66.7%)	2(33.3%)	6(3.3%)	0.806
Neonatal death	3(20%)	12(80%)	15(8.3%)	0.0001*
Admission to NNICU	14(66.7%)	7(33.3%)	21(11.6%)	0.631
Birth asphyxia	3(60%)	2(40%)	5(2.7%)	0.692

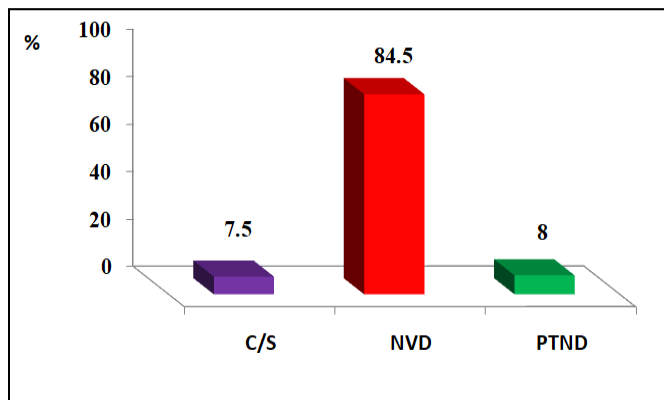


Fig.13. Mode of Delivery

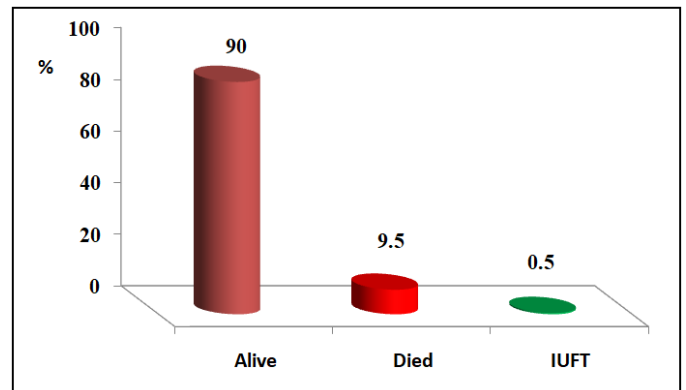


Fig.16 A. Outcome of babies

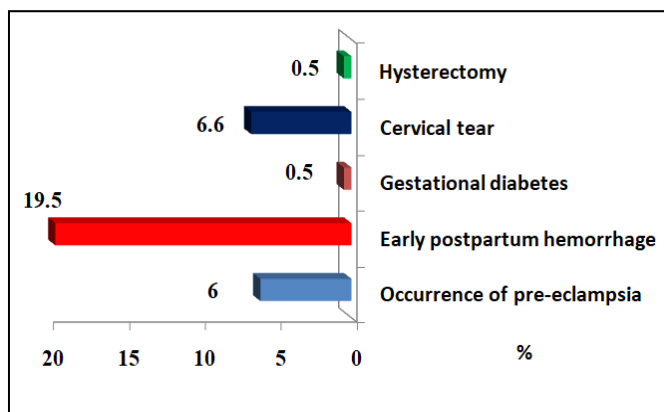


Fig.14. Outcome of mothers

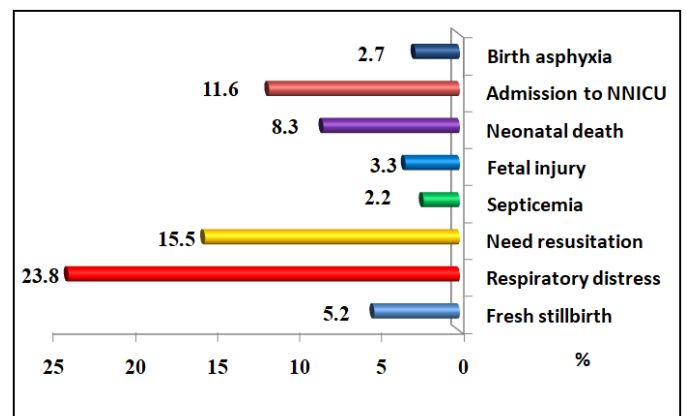


Fig.16 B. Outcome of babies

DISCUSSION

The study included 200 pregnant women, there were 123(61.5%) had adequate care and 77(38.5%) had inadequate care. In other study rates of inadequate/no prenatal care ranged from 8.3% to 8.9%.¹⁰ The mean age of mothers with adequate 28.5±7years and mean age of inadequate 32.3±6.3 years, this difference was highly significant p value was 0.0001. While in other study the findings indicate that the age of women with inadequate care was lower compared to those receiving adequate care (p = 0.003).⁴ Libyan nationality constitutes to 76% and 24% not Libyan. More than half (63.8%) of Libyan nationality had adequate care and 36.2% had inadequate care, while 54.2% of non-Libyan had adequate care and 45.8% had inadequate care, this difference was not statistically significant p value was 0.231. More than half (69%) of mothers were from Benghazi, while (62.3%) of Benghazi residence had adequate care and 59.7% of out-side Benghazi residence had adequate care this difference was not statistically significant p value was 0.723. In other study more than half of the participants (71.8%) were from urban residence.¹⁴ Maternal level of education, elementary level was recorded in 10.5% of all patients, of this 14.3% had adequate care and 85.7% had inadequate care. Secondary level was recorded in 37% of all mothers, 71.6% of this level had adequate care and 28.4% had inadequate care. At University level 52.5% of all patients had university level, 63.8% of them had adequate care and 41.7% had inadequate care the difference was highly statistically significant p value was 0.0001. The result similar to other study where the women with inadequate care had lower education (p = 0.00007).⁴

Maternal occupation was recorded in 30.5% of all patient, while 69.5% were not employed. More than half (68.9%) of employed mothers had adequate care and 31.1% had inadequate care, while 58.3% of patients not working had adequate care and 41.7% had inadequate care, the difference was not significant p value was 0.157. Also, in other study the working status was not significant difference p value was 0.4.⁴

Gravida ≤ 5 of all patients was 81.5% and 18.5% had >5. Gravida ≤ 5 was 69.3% had adequate care, and 30.7% had inadequate care, while gravid >5, 27% of them had adequate care and 73% had had inadequate care, this difference was statistically significant p value was 0.0001 Nuli para was constitute to 28.5% of patients, para 1-5 was 63.5% and >5 was 8%, 84.2% of nuli para had adequate and 15.8% had inadequate care, para 1-5, 56.7% had adequate care and 43.3% inadequate care, Para >5, only 18.8% had adequate care and 81.2% had inadequate care, these difference was statistic ally significant p value was 0.0001.

History of abortion was positive in 24%. Patients with positive history of abortion 43.8% of them had adequate care and 56.3% had inadequate care, patients with negative history of abortion 67.1% had adequate care and 32.9% had inadequate care, this difference was statistically significant p value was 0.004. More than half of all patients (69.2%) had all previous delivery normally, 16.1% c/s and 14.7% both. In patients with normal vaginal delivery 47.5% had adequate care and 52.5% inadequate care, patients with C/S 65.2% of them had adequate care and 34.8% inadequate care, Patients who had both type of deliveries 61.9% had adequate care and 38.1% had inadequate care the difference was not statistically significant p value was 0.198. Booking for prenatal care 73.3% booked at 1st trimester, 14.5% at 2nd trimester m 6% at 3rd trimester and 6% not booked at all.

Mothers booked at 1st trimester 77.6% of them had adequate care and 22.4% inadequate care, patients booked at 2nd trimester 31% of them and 69% had inadequate care. Patients booked at 3rd all of them had inadequate care, the difference was statistically significant p value was 0.0001. In similar study the patients with inadequate prenatal care started in more advanced gestational ages (p = 0.0003).⁴ In other study 210 (66.9%) were at their first visit in first trimester, 77 (24.5%) were at second trimester, and 27 (8.6%) were at third trimester.¹³

Mean visit of all patients was 6.9±2.9 times, mean number of visits for adequate care was 8.7± 1.3times and for inadequate care 4±2.5times this difference was statistically significant p value was highly significant p value was 0.0001. Mean number of USS for all patients was 6.8±2.9 times, mean of USS for patients with adequate care was 8.5±1.6times and in inadequate care 6.8±2.9times, this difference was highly statistical significant p value was 0.0001. Type of care received by mothers more than half of patients (53%) had privet care, 41% had public care and 6% had no prenatal care. Patients in private care 80.2% of them had adequate care and 19.8% had inadequate care. Patients in public care, 46.3% had adequate care and 53.7% had inadequate care., this difference was highly statistically significant p value was 0.0001. Intake of vitamin was positive in 86% of all patients, 79% of all patients use folic acid and 40.5% use iron supplement. More than half of patients in adequate care (69.2%) use vitamins, while 30.8% of inadequate care do, this difference was statistically significant p value 0.0001. Folic acid intake was positive in 73.4% of adequate care and 26.6% of inadequate care, the difference was statistically significant p value was 0.0001. Iron intake was positive in 79% of adequate care and 21% of inadequate care this difference was statistically significant p value was 0.0001. Preterm delivery was recorded in 11.5% of all patients, term delivery recorded in 83% of them and 4.5% were post term and 2% post date. More than half of preterm (56.5%) was present in adequate care group and 43.5% in inadequate group the difference was not statistically significant p value was 0.602. Term delivery was 60.9% in adequate care and 39.2% in inadequate care the difference was not statistically significant p value was 0.673. Majority of post date (88.9%) was present in adequate care and 11.1% in inadequate care, the difference was not statistically significant p value was 0.084. Most of post term (75%) was in adequate care and 25% in inadequate care the difference was not statistically significant p value was 0.575. In other study preterm, 130 (61.9%) term 1, and 24 (11.42%) post-date delivery. There were no significant differences among two groups according to the gestational age at delivery (P = 0.3).⁴ Mode of delivery in current pregnancy was C/S in 7.5% of all patients, 84.5% was normal vaginal delivery and 8% was preterm normal delivery.

In C/S patients 66.7% had adequate care and 33.3% had inadequate care, 60.9% of normal delivery had adequate care and 39.1% had inadequate care, 62.5% of PTND had adequate care and 37.5% had inadequate care, this difference was not statistically significant p value was 0.906. In other study the difference was not statistically significant p value was 0.05.⁴ Preeclampsia was present in 6% of all patients, 50% in adequate care and 50% in inadequate care, the difference was not statistically significant p value was 0.067. This was similar to other study .⁴ Early post partum hemorrhage was in 19.5% of all patients, 48.7% of hemorrhage was in adequate group

and 51.3% in inadequate group the difference was not statistically significant the difference was not statistically significant p value was 0.067. Similar result recorded in other study.⁴ Gestational diabetes was recorded in one patient (0.5%), which was in adequate group. Similar result recorded in other study.⁴ Cervical tear recorded in 6.6% of all patients, 46.2% of it in adequate care and 53.8% in inadequate care, the difference was not statistically significant p value 0.378. Hysterectomy recorded in one patient (0.5%) which was in inadequate group. Mean birth weight for all babies was 2.9 ± 0.64 kg, mean birth weight of adequate group was 2.9 ± 0.63 kg and in inadequate group was 2.9 ± 0.68 kg, the difference was not statistically significant. In similar study the neonates born to women with inadequate care tended to have lower birth weights ($p = 0.05$).⁴ Male was constitute to 63.8% and female was 36.2% of all patients, 59.1% of males were in adequate group and 40.9% in inadequate group, 66.7% of females were in adequate group and 33.3% in inadequate group the difference was not statistically significant p value was 0.288. Majority of babies were alive (90%), 9.5% were died and 0.5% was IUFD, 62.2% of alive was in adequate group and 37.8% in inadequate group, 57.9% of died babies was in adequate group and 42.1% in inadequate group, IUFD death was only one baby (0.5%) in inadequate group, the difference was not statistically significant p value was 0.419.

Fresh stillbirth was recorded in 5.2% of all patients 50% in each group, the difference was not statistically significant p value was 0.458 Respiratory distress was recorded in 23.8%, 67.4% of them in adequate group and 32.6% in inadequate group the difference was not statistically significant p value was 0.390. Babies who need resuscitation was recorded in 15.5% of all patients, 64.3% was in adequate group and 35.7% in inadequate group, the difference was not statistically significant p value was 0.775. Septicemia was recorded in 2.2% of all babies, 25% of them in adequate group and 75% in inadequate group, the difference was not statistically significant p value was 0.125. Fetal injury as Erb's palsy was recorded in 3.3% of all babies, 66.7% of them from adequate group and 33.3% in inadequate group, the difference between the two group was not statistically significant p value was 0.806. Neonatal death was recorded in 8.3% of babies, 20% of them in adequate group and 80% in inadequate group, the difference was statistically significant p value was 0.0001. In other study found that the newborn mortality rate within the first 72 h of life (2.3 vs. 0%, $p < 0.001$) were higher in Group I (< 3 prenatal care visits) than in Group III (≥ 6 prenatal care visits).⁹ Admission to NICU recorded in 11.6% of all patients, 66.7% was in adequate group and 33.3% in inadequate group the difference was not statistically significant p value was 0.631. In other study Neonates born to women with inadequate care had higher rates of admission to NICU ($p = 0.02$).⁴ Also in other study there was a significant association between the number of prenatal care visits of the study group and the prevalence of admission to the neonatal ICU ($p = 0.02$) and the adult ICU ($p < 0.001$), as well as the newborn mortality rate within the first 72 h of life ($p < 0.001$).⁹ Birth asphyxia was recorded in 2.7% of all patients 60% of them in adequate group and 40% in inadequate group p value was 0.692.

Conclusion

More than quarter (38.5%) of mothers had inadequate care; mothers with inadequate care were older than mothers with adequate care. Level of education affecting the adequacy of

care, where the patients with adequate care had higher educational level. Working status of mothers was not affecting the adequacy of care. Number of pregnancy and parity affecting the level of adequacy, mothers with a smaller number of pregnancy and number of children had adequate care. Time of starting prenatal care affecting the adequacy of care, the earlier booking the more adequate care. Care in private show more adequate care than public sector. Outcome of mothers as preeclampsia, early postpartum hemorrhage and cervical tear were similar in both groups, while hysterectomy recorded in inadequate group. Outcome of babies as mean birth weight, IUFD, Fresh stillbirth, respiratory distress, respiratory distress was similar in both groups, while neonatal death was recorded in inadequate group more.

Recommendation

- 1-Future research should go beyond simply counting the number of visits and focus on studying the relationship between quality and content of PNC and pregnancy outcomes.
2. There is a need to develop a valid and reliable instrument to measure quality of PNC.
3. Computerized recording system for maternal and child health care system.

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