Maternal and Neonatal Outcomes in Women with Pre-eclampsia in Zagazig University Hospitals

Hanan M. Salim [1]**, Sanaa A. Nour Eldin** [2]**, Mohammad S. Mahdy** [3]
& Amina S. Gonead [4]

[1]*Clinical demonstrator, Obstetrics and Gynecological Dep., Faculty of nursing, Zagazig University,* [2] *Prof. of Obstetrics and Gynecological Nursing, Faculty of Nursing, Zagazig University,*[3] *Professor of Obstetrics and Gynecology, Faculty of Medicine, Zagazig University* ,[4] *Assistant Prof. of Obstetrics and Gynecological Nursing, Faculty of Nursing, Zagazig University*

Abstract:

Background: Pre-eclampsia (PE) is a disease with worldwide significance to mothers and infants; it may have health hazards that increase maternal, fetal and infant morbidity and mortality. **Aim** of the present study was to evaluate the maternal and neonatal outcomes of pregnancy associated with pre-eclampsia. **Sample& setting:** A case-control prospective study was selected in carrying out this study and a representative sample of two groups, one from women diagnosed with pre-eclampsia (100) and the other from normotensive women (100), were admitted to Zagazig University maternity hospital. **Tools** used for data collection were; an interview questionnaire sheet, a Clinical assessment form, Ultrasonography, Cardio-Tocography, Partograph, a Summary of labor sheet, a Problems-encountered sheet and a Neonatal assessment sheet. **Results** of present study revealed that, the incidence of pre-eclampsia were higher among younger women (<25) and older (35+) than normotensive women. Cesarean section rates were significantly higher in the group with pre-eclampsia than in the control group (p < 0.05). Low Apgar score, low birth weight, more admission to the NICU as well as newborn deaths were significantly higher among the pre-eclamptic group (p = 0.000). **It can be concluded that**, lower gestational age, less parity, higher cesarean section rate, low Apgar score and low birth weight neonates were more frequent in pre-eclamptic women than in healthy pregnant women. **The study recommended** that: written clinical guideline or nursing protocol for the management of patient with pre-eclampsia should be developed and used by the nursing staff. Improving quality of ante-natal care for women with preeclampsia is highly recommended at Zagazig university hospitals.

Keywords: pre-eclampsia, maternal outcomes, neonatal outcomes.

Introduction:

In the past, the diagnostic criterion for pre-eclampsia (PE) has varied. This has led to a difficulty in comparing studies on treatments, or outcomes, in different populations. There is now a widely accepted classification system of hypertensive disorders in pregnancy, which defines pre-eclampsia as hypertension of at least 140/90 mmHg recorded on two separate occasions at least 4 hours apart and in the presence of at least 300 mg protein in a 24-hour collection of urine arising de novo after the 20th week of gestation in a previously normotensive women and resolving completely by the sixth postpartum week. Although the precise mechanism of the disorder remained elusive but according to new emerging consensus, it is a complex polygenetic trait in which maternal and fetal genes as well as environmental factors are involved **(Laivuori, 2007).**

Lykke, Paidas and **Langhoff-Roos (2009)** defined mild pre-

eclampsia as the presence of hypertension (BP >140/90 mm Hg) on 2 occasions at least 6 hours apart. Proteinuria is defined as the presence of greater than or equal to 1+ protein on random dipstick or at least 300 mg of protein in a 24-hours urine collection. According to **Sibai** and **Barton (2007)** severe pre-eclampsia is defined as; systolic blood pressure 160-170 and/or diastolic blood pressure of 110mmHg or higher measured on at least two occasions over several hours, combined with proteinuria >300mg total protein in a 24-hours urine collection, or ratio of protein to creatinine >30mg/mmol.

There also appears to be a maternal genetic predisposition to pre-eclampsia, as there is three to four fold increases in the incidence of PE in the first-degree relatives of affected women. Finally, there are a number of general medical conditions and pregnancy specific factors that predispose to the development of PE. These include; conditions in which the placenta is enlarged (multiple gestation, diabetes, hydrops), pre-existing hypertension or renal diseases and pre-existing vascular diseases such as; in diabetes, or autoimmune vasculitis **(Barton & Sibai, 2008)**.

Although hypertension and proteinuria are the diagnostic criteria for PE, they are only sings of the pathophysiologic changes that occur in the disorder. One of the most striking physiologic changes is intense systemic vasospasm, which is responsible for decreased perfusion of virtually all organ systems. Perfusion also is diminished because of vascular hemoconcentration and third spacing of intravascular fluids. In addition, PE is accompanied by an exaggerated inflammatory response and inappropriate endothelial activation

(Sibai, Dekker & Kupfermine, 2005).

Complications of hypertension are the third leading cause of pregnancy related death, superseded only by hemorrhage and embolism. Pre-eclampsia is associated with increased risk of placental abruption, acute renal failure, cerebrovascular and cardiovascular complications, disseminated intravascular coagulation, and maternal death. Consequently, early diagnosis of PE and close observation are imperative **(Ahmed, 2011,** and **Haddad & Sibai, 2009)**.

The nurse midwife plays a significant role in providing care for high risk pregnant women. She should recognize that the mainstay of treatment for pre-eclampsia remains ending the pregnancy by delivering the fetus (and the placenta). This can be a significant problem for the baby if pr-eclampsia occurs at 24-28 weeks of gestation; thus many strategies have been proposed to delay the need for delivery. The nurse midwife could assist with early recognition of the symptomless syndrome **(Bruck & comerford, 2008)**.

Significance of the study:
In Egypt, pre-eclampsia ranks the second leading cause of maternal death (after hemorrhage). In Egypt, the prevalence of PE is 10.7% in a community based study of **(Gadalla et al., 1986)**. While, in hospital based studies of **(Mahaba et al., 2001),** it ranged from 9.1 % to 12.5% of all deliveries. Health promotion is of particular importance to midwives who promote health rather than manage a diseased ill health .There is now an explicit need for the midwife to direct her attention to identify risk factors,

maternal and fetal complications associated with PE. Therefore, this study carried out to investigate risk factors as well as maternal and neonatal outcomes in women with PE.

Aim of the Study:

The aim of the present study was to evaluate the maternal and neonatal outcomes of pregnancy associated with pre-eclampsia.

Research questions

1. What is the effect of pre-eclampsia on maternal outcomes?
2. What is the effect of pre-eclampsia on neonatal outcome?

Subjects and methods

Design:
A case-control prospective, study was used to investigate the current research problem.

Setting:
This study was conducted at Zagazig University maternity hospital.

Sample:
The sample size was taken according to statistical equation, with confidence interval (CI=95%), (power=80%) and odds ratio (G2/G1=1). The study population consisted of all parturient women attending to the study settings randomly. A total of 200 parturient women (100 with pre-eclampsia and 100 control without the disease) were recruited for this study according to the following criteria:

1. Having a definite specific diagnosis of PE
2. Gestational age ≥33 weeks.

Sampling technique:
A consecutive sampling technique was used; eligible women were recruited in the sample after application of the inclusion criteria. This was continued until the required sample size was fulfilled.

Tools of data collection:

Data collection was done through the use of the following tools:

I. A Structured interviewing questionnaire was designed to collect data about socio-demographic characteristics and the history of pregnant women.

II. Maternal assessment sheet: This sheet included; clinical examination of the study subjects "on admission to labor room, Ultrasonogrphy: To evaluate fetal gestational age, fetal viability, Cardiotocography: It was done for every preeclamptic woman to assess the fetal heart rate and uterine contractions and investigations.

III. Partograph: the partograph was used for every participant in order to evaluate fetal and maternal condition and to evaluate the labor progress during the active phase of the first stage of labor.

IV. Summary of labor sheet: It included data about the duration of the stages of labor, the mode of delivery whether spontaneous or cesarean section.

V. Problems encountered sheet: It was designed to evaluate the problems encountered among patients which include presence of postpartum hemorrhage, administration of IV blood, eclampsia, and admission to intensive care unit, disseminated intravascular coagulation and maternal death

VI. Neonatal assessment record: For evaluation of the neonatal condition the following data were obtained: Apgar scores at the first and fifth minute, weight of the neonate, admission of the neonate to Neonatal Intensive Care Unit

(NICU) or not , resuscitation and neonatal death.

Pilot study:

A pilot study was conducted on 20 parturient women to assess the applicability of the data collection tools and the feasibility of the study. The subjects were excluded from study sample.

Field work:

Data collected through a period of seven months - from first of October 2010 to the end of April 2011. Three days/week from 9 Am to 3 PM. After obtaining parturient woman's acceptance to participate in the study the researcher started to collect data through three phases: 1) interviewing, 2) assessment and 3) evaluation

- **Interviewing phase**: All parturient women in both groups were interviewed (structured interview) to collect data related to socio-demographic characteristics, obstetric profile, family history for chronic diseases, present medical history. Personal interview was done at the labor unit for both groups and it takes 10 minutes for each one.

- **Assessment Phase:** In this phase, the researcher started the examination of the parturient woman. Regular assessment of the maternal and fetal condition started immediately after admission to labor and delivery unit, by measuring vital signs, carrying out general, local abdominal and pelvic examination. Investigations required were done. Fetal condition was assessed as well as uterine contraction using the CTG and the partograph was used to assess the progress of labor and the condition of the mother during the first stage of labor. Care was provided to the woman during this stage and pertinent data was recorded.

- **Evaluation phase:** This phase started immediately after delivery by vaginal route or CS Apgar score at the first and fifth minute were recorded. Immediate care of the newborn was provided. Assessment was done for the mother and her newborn during the immediate postnatal period. Complications aroused were recorded.

Ethical and administrative considerations:
Official permission was obtained by submission of an official letter from the Faculty of Nursing to the responsible authorities of the study setting to obtain the permission for data collection. Concerning ethical consideration, the aim of the study was explained to every woman before participation, which was totally voluntary and an oral consent was obtained. Women were assured that the study maneuver will cause no actual or potential harm on them and professional help will be provided whenever needed. Women were notified that they can withdraw at any stage of the research; also they assured that the information obtained during the study will be confidential and used for the research purpose only.

Statistical design:

Data enter and statistical analyses were performed using SPSS version 16. All numeric data were expressed in the form of range (minimum to maximum), mean and standard deviation (SD). Categorical data were expressed in the form of frequencies and percentages. Pearson's chi square test, Mont Carlo exact and Fishers exact test, Student "t" tests and ANOVA test were also used.

Results:
Table (1): describes socio-demographic characteristics of

parturient women in the two study groups. Women with pre-eclampsia were significantly (p=0.001[**]) younger (<25) and older (35+) than normotensive women (41.0% vs. 27.0 %, and 21.0 % vs. 9.0 % respectively). It is evident that more than one fourth (28.0%) of the pre-eclamptic women were illiterate or can read and write compared to 21.0% of the normotensive women. Cases and control groups also had higher percentage of housewives (92.0% vs. 68.0% respectively).

Table (2): regarding gravidity, the table shows that the highest percentage were primigravida in both control and pre-eclamptic groups (52.0% and 39.0% respectively), but with no statistical significant difference. As for the parity more than one fifth (26.0%) of pre-eclamptic women were primipara compared to only 6.0% of the normotensive women. Regarding the history of abortion, pre-eclamptic women were more likely to have previous abortion (62.3%) compared to (31.3%) in the normotensive group.

Figure (1): illustrated that out of those who had pre-eclampsia 74.0% had severe and 26.0% had mild pre-eclampsia as diagnosed by the attending physician.

Table (3): It is obvious that the severity of the pre-eclampsia was the most common indication in patients' group with the highest percentage (81.6%), followed by oligohydraminous (40.8%) compared to zero in the control group. The difference observed was statistically significant (P=0.000*&0.02*respectively). Failure of labor progress accounted for 16.3% of the indications in the pre-eclamptic women versus 33.3% among the control group, also the difference observed was statistically significant (X^2=20.7and P=0.000*)

Table (4): show that (6.0%) of women in the pre-eclamptic group had postpartum eclampsia compared to 0.0 % among the control group, admission to ICU was more common among pre-eclamptic group (18.0%) than the control group (3.0%). Moreover, 2 women in the preeclamptic group had an attack of DIC, and their mean hospital stay was longer (4.8±3.8) than women in the control group.

Table (5): points to statistical significance differences between the mean Apgar scores of the 3 groups at the first and fifth minute. Thus the score was much less (7.1±2.2 and 7.5±2.4) among the newborn of the severe preeclamptic group compared to those who had their mothers had mild pre-eclampsia or the control group. In addition, the newborns of women with severe pre-eclampsia were more likely to have the lowest mean birth weight (2.5±0.52) compared to those in mild preeclamptic and control groups (3.1±0.42 and 3.1±0.47 respectively).

Figure (2): shows the prevalence of neonatal complication among the three studied groups. Thus, 30% in severe cases had neonatal complication compared to 12% in mild cases and 3% in normotensive group.

Discussion:
Age, at both extremities of the reproductive period, is considered a risk factor to pregnancy outcomes. The present result showed that women with pre-eclampsia were significantly (p=0.001[**]) more likely to be younger than < 25 and older 35 + than normotensive women. These findings are in agreement with **Woldeselassie (2005)** in Namibia in his study about Pre-eclampsia and its outcome, Maternal and Neonatal Morbidity and Mortality. He found that younger women were more vulnerable to pre-eclampsia and maternal age ≥35 years carried an increased risk of developing pre-eclampsia. On the other hand **Saadat et al., (2007)** in Iran, in their study about Maternal and neonatal

outcomes in women with pre-eclampsia, have reported that there was no difference in the categorized ages between the two groups.

It is evident that more than one fourth (28.0%) of the pre-eclamptic women were illiterate or can read and write compared to 21.0% of the normotensive women. They also had higher percentage of housewives (92.0% vs. 68.0% respectively). These present study findings related to education and job status are disagree with **Saftlas et al., (2004)** in their study about Work, Leisure-Time Physical Activity, and Risk of Pre-eclampsia and Gestational Hypertension in New Haven, who have emphasized that unemployed women or those who had sedentary job were at decreased risk of pre-eclampsia. Might be related to low educational level attainment reduces access to medical care for screening and is often associated with greater exposure to poor nutrition, physical and mental stress as well as unhealthy life style.

Concerning parity, the present study showed that, more than one fifth (26.0%) of pre-eclamptic women were primipara compared to only 6.6% of the normotensive women, and that the mean parity was lesser (2.1±1.1) in the PET group than the normotensive group (2.7 ±0.96) with statistical significant difference (p = 0.005). Equivalently, **Saadat et al., (2007)** reported that the mean parity in normotensive women was higher than that in Pre-eclamptic patients (3.6±0.74 vs. 2.3±0.65 respectively; p<0.05). Similar finding was also reported by **Fatemeh et al., (2010)** and **Luealon** and **Phupong (2010)** in Thailand. It is believed that this is related to the maternal first exposure to trophoblasts, which are of fetal origin.

The great majority of the pre-eclamptic women in the present study had previous abortion, compared to less than one third of the normotensive group. Similar findings were reported by **Trogstad et al (2008)** in Norwegian in their study about Previous Abortions and Risk of Pre-eclampsia.

According to the present study results, almost three quarters (74.0%) were diagnosed as having severe preeclampsia and 26.0% had mild PET. This figure is very close to that revealed by **Sangkomkamhang, Laopiboon** and **Lumbiganon (2010)** in Khon Kaen in their studies about, Maternal and Neonatal Outcomes in Pre-eclampsia and Normotensive Pregnancies: who have reported that among 151 pre-eclamptic patients, 57 (37.7%) had mild, 91 (60.3%) had severe pre-eclampsia and 3 (2%) had eclampsia.

Concerning current cesarean section indications, the present study findings have indicated that the severity of the pre-eclampsia was the most common indication in patient group with the highest percentage (81.6%), followed by oligohydraminous (40.8%) compared to zero in the control group. The difference observed is statistically significant (P=0.000*). The findings are in agreement with **Hall et al.,(2000)** in South Africa who reported that 81.5% of the preeclamptic women gave birth by means of caesarean section, with fetal distress being the commonest reason for delivery. Similarly, **Sangkomkamhang et al., (2010)** have shown that the most frequent indications of CS were the severity of the condition, the presence of fits and fetal distress. This might be explained by the fact that the reasons for cesarean section in pregnancies with pre-eclampsia were aimed to reduce further serious complications of the fetuses as well as the mothers.

According to the present study results, the most common maternal complications was; ICU (18.0%) eclampsia (6.0%) followed by DIC and postpartum

hemorrhage (2.0 %). These results are partially similar to those achieved by **Kuchake et al., (2010**) in India who have reported that HELLP syndrome was present in 8.0% and eclampsia in 10.0%of women in the Pre-eclamptic group. Meanwhile **Sangkomkamkang et al., (2010)** have demonstrated that pre-eclampsia was associated with no maternal mortality, but higher frequencies of maternal morbidity and neonatal morbidity and mortality were encountered. This might be explained by late in referral, and poor antenatal care.

As regards fetal outcome, the mean Apgar score at the first and fifth minute was lower among newborn of women with mild and severe pre-eclampsia compared to those in the normotensive group with statistical significant difference (P=0.000*). Factors that may influence a low Apgar score included fetal hypoxia and preterm birth. Fetal hypoxia in preeclampsia could be explained by a decrease in the uteroplacental blood flow resulting from severe hypertension **Marcorelles(2010)**. These findings coincided with **Ayaz et al ., (2009)** in Abbottabad who in their study about Neonatal Outcome in Preeclamptic Patients who have reported that, low APGAR score was seen in 31 (42.46%) cases as compared to controls (4.10%).

Concerning neonatal complications, the present study shows that women in severe preeclamptic group had higher percentage of newborns admitted to the NICU (33.3%) compared to 16.7% in mild group and none in normotensive group. This finding is in agreement with **Ayaz et al., (2009)**, who have reported that there was high need for admission to NICU (26.02%) in cases compared to controls (9.5%).

Conclusion:

In the light of the main study findings, the researcher can conclude that: maternal age less than <25years and older than 35 years, history of preeclampsia in previous pregnancy and chronic hypertension, primiparity, family histories of preeclampsia were associated with a significantly risk of preeclampsia women.. Severity of preeclampsia and oligohydraminous were the most common indications of C.S in preeclamptic group, while fetal distress was more common in control group. Maternal morbidity and mean hospital stay after delivery was significantly higher among the preeclamptic group .Poor fetal outcome in the form of low Apgar score, low birth weight, more admission to the NICU as well as newborn deaths were significantly higher among the preeclamptic group.

Recommendations:
In the light of the study findings it is recommended that

- The maternity nurse should be alert for early detection and identification of risk factors associated with pre-eclampsia in order to reduce maternal and fetal complications.

- Proper care during pregnancy with regular follow up visits together with natal and postnatal care is essential to prevent fetal and maternal complications.

- Conducting periodical educational classes for pregnant women about danger signals of pregnancy, risk factors and complications of pre-eclampsia and nutrition are strongly recommended.

- Further studies of pre-eclampsia should focus on the measures for its prevention and management.

Table (1): Distribution of the studied women according to their socio-demographic characteristics

Socio-demographic Characteristics	Control (n=100)		Cases (n=100)		X^2	P
	No	%	No	%		
Age						
▪ < 25 years	27	27.0	41	41.0	14.3	0.001**
▪ 25-	64	64.0	38	38.0		
▪ 35+	9	9.0	21	21.0		
Mean ± SD	26.8 ± 5.3		26.7 ± 5.3		t=0.17	0.862
Job status						
▪ Housewife	68	68.0	92	92.0	18.0	0.000**
▪ Working	32	32.0	8	8.0		
Education					25.11^	0.000**
▪ Illiterate & read and write	21	21.0	28	28.0		
▪ Primary	0	0.0	4	4.0		
▪ Preparatory	2	2.0	0	0.0		
▪ Secondary	48	48.0	62	62.0		
▪ University	29	29.0	6	6.0		

* P < 0.05 (significant)
^ P value based on Mont Carlo exact test

Table (2): Distribution of the studied women according to their obstetrical history (n=200)

Obstetric history	Control (n=100)		Cases (n=100)		X^2	P
	No	%	No	%		
Gravidity						
▪ Primigravida	52	52.0	39	39.0	3.41	
▪ 2-3	24	24.0	35	35.0	2.91	0.136
▪ 4+	24	24.0	26	26.0	0.11	
Mean ± SD	2.2 ±1.5		2.4 ±1.5		t=0.96	0.340
Parity						
▪ Para 0	52	52.0	39	39.0	3.41	
▪ Para 1	6	6.0	26	26.0	14.81	0.000**^
▪ 2-3	27	27.0	24	24.0	0.24	
▪ 4+	15	15.0	11	11.0	0.40	
Mean ± SD	2.7 ± 0.96		2.1 ±1.1		t=2.59	0.011*
Abortion [n]						
▪ Negative	33	68.8	23	37.7	10.4	0.001*
▪ Positive	15	31.3	38	62.3		

[n] Not applicable for Primigravida females
* P < 0.05 (significant)
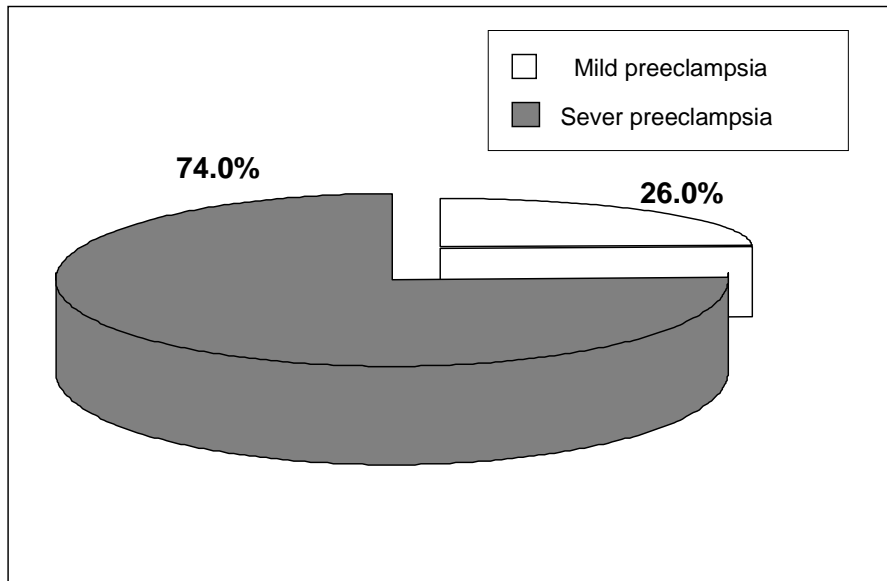*^ P value based on Mont Carlo exact test*

Figure (1): Distribution of the Preeclamptic group according to the types of preeclampsia.

Table (3): Distribution of women according to the indications of cesarean section.

Indication for C.S $	Control (n=9)		Cases (n=49)		X^2	P
	No	%	No	%		
Fetal distress	9	100.0	6	12.2	32.3	0.000*^
Failed progress	3	33.3	8	16.3	20.7	0.000*^
Malpresentation	0	0.0	5	10.2	Fisher	1.0
Severity of preeclampsia	0	0.0	40	81.6	Fisher	0.000*
Previous cesarean section	0	0.0	15	30.6	Fisher	0.002*
Oligohydraminous	0	0.0	20	40.8	Fisher	0.02*

$ *More than one answer was allowed*

* *P < 0.05 (significant)*

^ *P value based on Mont Carlo exact test*

Table (4): Distribution of the studied women according to their maternal outcomes (n=200)

| Maternal outcomes	Control (n=100) No	Control (n=100) %	Cases (n=100) No	Cases (n=100) %	X^2	P
Postpartum eclampsia						
▪ Yes	0	0.0	6	6.0	Fisher	0.02*
▪ No	100	100.0	94	94.0		
Admission to Intensive care unite						
▪ Yes	3	3.0	18	18.0	16.8	0.000**
▪ No	97	97.0	82	82.0		
Disseminated intravascular coagulopathy						
▪ Yes	0	0.0	2	2.0	Fisher	0.497!
▪ No	100	100.0	98	98.0		
Hospital stay						
Mean ± SD	1.3 ± 0.77		4.8 ± 3.8		148.1^	0.000**

! P value based on Fisher exact test
* P < 0.05 (significant)

Table (5): Distribution of the studied women according to neonatal outcomes.

Neonatal assessment	Control (n=100) No	Control (n=100) %	Mild (n=26) No	Mild (n=26) %	Severe (n=74) No	Severe (n=74) %	X^2	P
Apgar score at 1 min								
▪ < 4	0	0.0	3	11.5	6	8.1		
▪ 4-6	6	6.0	0	0.0	19	25.7	30.5	0.000*^
▪ 7+	94	94.0	23	88.5	49	66.2		
Mean ± SD	8.1 ± 1.2		7.5 ±1.6		7.1 ± 2.2		F=8.5	0.000*a
Apgar score at 5 min								
▪ < 4	0	0.0	1	3.5	3	4.1	30.5	0.000*^
▪ 4-6	2	2.0	0	0.0	9	12.2		
▪ 7+	98	98.0	25	96.5	62	83.7		
Mean ± SD	8.9 ±1.0		8.3 ±1.9		7.5 ± 2.4		F=11.8	0.000*a
Birth Wight								
▪ < 2.5 kg	7	7.0	2	7.7	22	29.7		
▪ 2.5-3.5 kg	81	81.0	21	80.8	52	70.3	24.9	0.000*^
▪ >3.5 kg	12	12.0	3	11.5	0	0.0		
Mean ± SD	3.1 ± 0.47		3.1 ± 0.42		2.5 ± 0.52		F=31.2	0.000*a

a P value based on ANOVA test
* P < 0.05 (significant)

Figure (2): Prevalence of neonatal complication among the
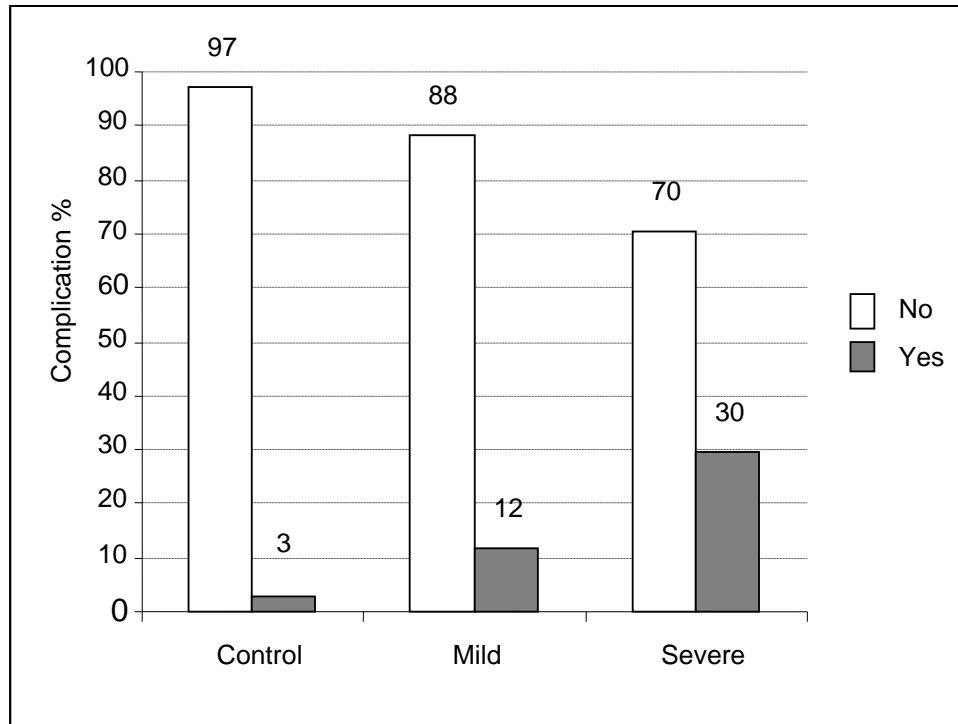
different study groups

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