Prevalence and Outcomes of Pre-eclampsia and its Related Factors in Referral Hospital of Ayatollah Mosavi in Zanjan-Iran

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Abstract

Background: The study of the prevalence, reasons, and various outcomes of pre-eclampsia in any region is of special importance in determining the prevention and medication strategies in that area.

Objectives: This study focuses on the prevalence and outcomes of pre-eclampsia and related factors in the referral Hospital of Ayatollah Mosavi in Zanjan Province.

Methods: This cross-sectional and analytical study was conducted on all the pregnant women who delivered their babies in Ayatollah Mosavi Hospital in Zanjan from September 2018 and March 2019. From among 1340 mothers in this study, 63 patients were considered as the sample based on the aim of this study, and 63 participants were selected by means of systematic randomized sampling and were placed in the control group. The data were collected using a researcher-made checklist. Analyses of the data were done using Mann–Whitney U test, Chi-square test, and Fisher's exact test ($p<0.05$).

*Results***:** This study proved that the majority of the mothers fell within the age range group of 20-35 (74.6%) characterized by multipar (66.6%). The results showed that the prevalence of pre-eclampsia in Zanjan Province was 5.5 percent. Based on the data, the pre-term and caesarean deliveries by mothers afflicted with pre-eclampsia were found to be 2.5 and 2.86 times, respectively ($p<0.05$). Furthermore, the experimental group babies needed the NICU care, which was 6.9 percent more than those of the control group ($p<0.001$).

Conclusion: Due to the high prevalence of pre-eclampsia in Zanjan Province and the unfavorable outcomes such as preterm delivery, caesarean, and baby's need for admission in the NISC, it seems that the medication and prevention strategies in the province should be under more review and investigation.

Keywords: Iran, pre-eclampsia, pregnancy outcome, prevalence

Introduction

Hypertensive disorders account for 16 percent of mothers' mortality rate in the developed countries. The important point is that more than half of deaths caused by hypertensive disorders are preventable [1]. Khareghani et al. reported the prevalence of pre-eclampsia and eclampsia in Iran as to be %0.05 and %0.23, respectively. Khareghani et al. failed to report pre-eclampsia cases in Zanjan [2]. The high mortality rate of mothers and babies in countries, which are characterized by the average and low- income levels and the blood pressure disorders, reveals the fact that the strategies taken by the government and other beneficiaries have not been effective [3].

Previous studies have considered many influential factors in the prevalence of pre-eclampsia like

mother's gestational age above 35 [4,5], the BMI index, nulliparous [6,7], education and ethnicity, residence [8], the socioeconomic status, triplet pregnancies, mother's underlying disease, family background, addiction with cigar, and pre-term delivery history [9-11]. Poor knowledge of caretakers to account for risky factors of pre-eclampsia, inadequate midwifery cares, and delay in diagnosis and referral to the equipped centers are known among other factors leading to pre-eclampsia [12].

Pre-eclampsia leads to perfusion disorder and fetal dysfunction due to blood vessel disarray, endothelial cell injury, and oxidative stress. These factors in turn give rise to higher mortality and morbidity rate of the fetus and baby due to intrauterine growth restriction (IUGR), intrauterine fetal demise, meconium excretion [13], prematurity, Small for Gestational Age (SGA), low birth weight (LBW: Birth weight), Neonatal Resuscitation Program (NRP) [14,15], and baby's need to special care after birth [5,11,16-20]. Moreover, based on previous studies, pre-term deliveries after pre-eclampsia and eclampsia were estimated to be about 47 to 370 cases in 1000 cases [18], which is the main cause of baby mortality rate worldwide [19].

Each of the pre-eclampsia pertinent factors and their outcomes among various populations has different predictive roles [17]. The main modern midwifery challenge is the early diagnosis of the pregnancies that are highly risky in terms of pre-eclampsia outbreak. Therefore, more studies on risky factors of pre-eclampsia would deepen the understanding in this respect [12].

It seems that exploring the causes and extent of various outcomes of pre-eclampsia is of special importance in determining the prevention and medication strategies in any region. Besides, its different demographic and climatic conditions as well as the existence of such pollutants in Zanjan province needs further investigations. Therefore, this study focuses on the pre-eclampsia outcomes and related factors in the referral hospital of Ayatollah Mosavi in Zanjan.

Methods

This cross-sectional analytical study was conducted on the pregnant women who had delivered in Ayatollah Mosavi Hospital of Zanjan from September 2018 to January 2019. The study was approved by Zanjan University of Medical Sciences with the code A-12-1203-1 with the ethics code of (IR.ZUMS.REC.1397.166). Ayatollah Mosavi Hospital of Zanjan is the only highly specialized hospital in Zanjan province, and pre-eclampsia patients in the province refer and are referred to this hospital. Hence, estimating the prevalence of pre-eclampsia in the hospital would indicate its prevalence all over the province. The inclusion criteria in the study included the gestational age of 20 weeks or higher and single pregnancy. Moreover, the exclusion criteria included mother's underlying disease, smoking and drug addiction, history of the Assisted Reproductive Technology (ART), and complicated pregnancies. The pre-eclampsia patients at the hospital were diagnosed based on the primary and specialized care criteria (2013) of American College of Nurse-Midwives. Seventy four out of 1340 mothers hospitalized in the delivery hospital suffered from pre-eclampsia. Eleven members of the group were removed from the study due to suffering from underlying diseases. To select the group for comparison purposes, 63 people who were not suffering from pre-eclampsia were selected based on the systematic random sampling method with respect to the entry criteria. The natal and material outcomes were compared in the two groups. The data collection tool was a checklist prepared by the researcher, which included information about mother's age and her gestational age as well as the sex of the baby, the baby's need for resuscitation, mode of delivery, baby disorders, and baby fate. To analyze the data, SPSS version 25 was used. To check the normality of the data, the K-S test was used ($p<0.05$).

Since the data was not normal to compare the means of the groups, Mann–Whitney U test was used for the quantitative data, and Chi Square and Fischer Exact tests were used for the nominal and ordinal data.

Results

The findings showed that a majority (74.6%) of mothers fell within the age group of 20 and 32. Among the total participants, 84.1% lacked any academic education, 66.6% were multiparous, and 20.6% had abortion records. (Table 1) displays the information of the experimental and control group mothers.

Table 1: Specifications of Mothers in the Experimental and Control Groups

Variables	Variable Sub-Group	Pre-eclampsia Group Number (percent)	Control Group Number (percent)	OR (CI)	P-value**
Age of Mother (Year)	20>	(4.8) 3	(14/3) 9	3/13(0/7-12/2)	0/80
	20-35	(76.2) 48	(73/0) 46	1	
	35<	(19) 12	(12/7) 8	1/43(0/53-3/8)	0/46
Area of Residence	City	(66/7) 42	(33/3) 21	4(1/90-8/39) 1.00	>0/001*
	Village	(33/3) 21	(66/7) 42		
Educational Status	Non-Academic	(79/4) 50	(88/9) 56	2 (0/7-5/6) 1	0/14
	Academic	(20/6) 13	(11/1) 7		
Parity	Nulliparous	(30/6) 19	(34/9) 22	1/47 (0/5-2/3) 1	0/7
	Multipar	(69/4) 43	(65/1) 42		
Abortion Record	Yes	(20/6) 13	(20/6) 13	1 1	0/5
	No	(79/4) 50	(79/4) 50		

*P-value≤0.05   **chi-Square

The frequency of the women suffering from pre-eclampsia among urban citizens (66.7%) was found to be twice as many as those in rural areas (33.3%) (p<0.001). Hence, the chance of the urban dwelling mothers' affliction with pre-eclampsia was four times (CI: 1/90-8/39) higher than that of their rural counterparts. Based on the findings, the outbreak of pre-eclampsia in referral hospital of Zanjan Province was 5.5%.

The analysis of the pre-eclampsia outcomes revealed that the frequency of pre-term delivery of the pre-eclampsia mothers was more than that of the control group (p=0.01). Consequently, the chance of the pre-term delivery outbreak among the pre-eclampsia mothers (CI: 1.1-5.3) was 2.5 times more than that of women diagnosed with normal blood pressure. The results also showed a significant relationship between newborn babies being stained with meconium and premature rupture of membrane (p≤0.05).

Moreover, the probability of caesarian delivery by the group suffering from pre-eclampsia (CI: 1.38-5.9) was 2.86 times more than that of the control group (p=0.004). A look into the outcomes of the delivery of newly born babies showed that their sex, need to resuscitation, and disorders played no significant role in the two groups (p>0.05). A single case of disorder in a baby was identified. The mother (G3P2) was 30 years old residing in a village and was diagnosed with 28-week pregnancy. The lady had delivered her baby with a 1-min Apgar score of 2.

In this study, 36.5 percent of the babies of the mothers afflicted with pre-eclampsia were transferred to the NICU section. The chance of the transfer of the baby having a mother with pre-eclampsia to the NICU section (CI: 19/7- 2/4) was almost seven time higher than that of mothers with normal blood pressure (See Table 2).

Table 2. Comparing Maternal and Neonatal Outcomes in the Experimental and Control Groups

Variables	Variable Sub-Group	Pre-eclampsia Group Number (percent)	Control Group Number (percent)	OR (CI)	P-value**
Gestation Age at Time of Baby Delivery	Pre-term	(46) 29	(25/4) 16	2/5 (1/1-5/3)	[a]0/01*
	Term	(54) 34	(74/6) 47	1	
Sex of Baby	male	(36/5) 23	(63/5) 40	1	[a]0/2
	Female	(47/6) 30	(52/4) 33	1/58 (0/7-3/22)	
Neonate Needs CPR	Yes	(17/5) 11	(14/3) 9	1/26 (0/4-3/3)	[a]0/6
	No	(82/5) 52	(85/7) 54	1	
Mode of Delivery	Natural	(42/9) 27	(68/3) 43	1	[a]0/004*
	Caesarian	(57/1) 36	(31/7) 20	2/86(1/38-5/9)	
Congenital Abnormality	Observed	(1/6) 1	0	1	[a]0/3
	Not Observed	(98/4) 62	(100) 63	1/01 (0/9-1/04)	
Fate of Baby	Given to Mother	(60/3) 38	(90/5) 57	1	0.001<[a]*
	Admitted in NICU	(36/5) 23	(7/9) 5	6/9 (2/4 -19/7)	
	Dead	(3/2) 2	(1/6) 1		
Rupture of Membrane	Occurred	(1/6) 1	(7/9) 5		0/2[b]
	Not Occurred	(98/4) 62	(90/5) 57		
Meconium-Stained Fluid	Seen	3 (4/7)	(6/3) 4		0/6[b]
	Not Seen	(95/3)60	(93/7) 59		

*P-value≤0.05   a: chi-Square   b: Fisher exact test

Two cases of baby mortality were also recorded in the group. The first case was related to the baby of a 27-year-old mother (G3Ab2) with 26-week pregnancy suffering from pre-eclampsia. The baby with the first minute apgar score of 1 died later. The second case of death concerned the baby of a 26-year-old mother (G1) in the 26th week of pregnancy without blood pressure. Her baby was born on apgar 4 record and then died. This study showed that baby height and head circumference related to the mothers suffering from pre-eclampsia was less than that of the control group (p<0.05), whereas the average weight of the control group babies was more than that of the experimental group (p=0.01). The weight (p<0.001 ‹r=0.88), height (p<0.001 ‹ r=0.55), and head circumference (p<0.001 ‹ r=0.77) of the babies had a significant relationship with the gestational age of the mother at the time of birth. This indicates that since those with pre-eclampsia delivered babies sooner, the indices were significantly less than those of the other group (See Table 3).

Table 3: Experimental and Control Groups' Baby Birth Parameters

Variables	Pre-eclampsia Group Mean (SD)	Control Group Mean (SD)	P-value **
Birth Weight	2703.1±790.45	3082.62±626.3	0.011
Newborn Head circumference	33/81 ± 3/3	34/46 ± 1/3	0.04*
Newborn Height	48/2 ± 5	50/8 ± 2/4	0.001*

*P-value≤0.05   **Mann-Whitney

Discussion

Based on the findings of the present study regarding pre-eclampsia maternal outcomes, caesarean and pre-term deliveries were more spotted among mothers with normal blood pressure level. Moreover, the babies in this group were more in dire need of hospitalization in the NICU ward as they were less tall and their head circumference was less than those of the control group. The pre-eclampsia prevalence rate in the referral hospital of Zanjan was 5.5 percent, which is much higher than that of a study by Kherqani et al. The scholars found that pre-eclampsia and eclampsia prevalence rate in Iran were 0.05% and 0.23%, respectively. This number was reported to be 8.9% in Brazil, 3.3% in Australia, 3.2% in India, and 4.7% in Tailand [2]. Mothers' age in this study had no significant relationship with pre-eclampsia. The findings of the present study are consistent with those of Right et al [9].

Nonetheless, the results of some other studies contradict our findings [6,21].

Moreover, the findings of this study demonstrated that there was no significant relationship between parity and pre-eclampsia, whereas other scholars reported contradictory findings [9,10,22]. The reason for this discrepancy could be related to sampling as well as the limited number of the participants. The studies had different types of methodology and sampling method.

Based our findings, a small number of urban mothers suffered from pre-eclampsia. Kahsay et al. in Ethiopia showed that rural women had more chance of having pre-eclampsia [8]. In that study, rural women had improper living status, while women in Zanjan Province had adequate economic status in our study. Moreover, the level of the industrial and urban pollution can be a cause of pre-eclampsia relating to the area of residence [23]. Therefore, the difference in the sampling environment was another essential factor for contradictions in the results of the two studies.

This research also showed that the chance of pre-term delivery of mothers with pre-eclampsia was significantly (2.5 times) more than that of mothers diagnosed with normal blood pressure. A good number of studies have indicated a significant relationship between pre-eclampsia and pre-term delivery [24-28]. Sibai et al. also confirmed the relationship in premature pre-term delivery (the age of delivery was less than 34 weeks); however, their study showed that pre-eclampsia had no significant relationship with the late maturing pre-term (24 to 36 weeks) delivery [29]. This study does not present a clear-cut classification of pre-term delivery; therefore, it cannot be carefully compared with the findings of Sibai et al.

This study showed that caesarian delivery by mothers afflicted with pre-eclampsia was significantly more than that of the control group members. This finding agrees with the findings of previous studies [10,22,30]. No study was found to contradict this finding. It seems that due to the unfavorable outcomes of pre-eclampsia including distress, hypoxia, and decollement, the rate of caesarian delivery by the pre-eclampsia mothers was higher than that that of other mothers, as shown by all studies.

This study also found that rupture of membrane and pre-eclampsia was not associated. No pervious study estimated the relationship between these two and compared them with each other.

In this study, no significant relationship was observed between meconium excretion and pre-eclampsia. A study by Adiso et al. on the reasons of meconium-stained amniotic fluid showed that pre-eclampsia (AOR 3.45) raised the possibility of the meconium-stained amniotic fluid [13]. Kumari's findings were in contradiction with our findings [31]. Adiso et al. have justified the reason for the contradictions on the ground that the fetus suffers from hypoxia due to fetal dysfunction in the pre-eclampsia pregnancies, and loosening of sphincter rectum meconium is excreted in such as case [13]. It seems that the reason for the contradictory results of this study with those of the previous two studies lies in the type of management of pre-eclampsia and midwifery interventions in the target hospitals. Moreover, the methodology of the studies was different from that of our study.

The findings indicated that babies in the two groups had significant differences in terms of weight. Many studies have confirmed this finding [10,19,25,28,30,32]. Likewise, Sharaf et al. reported that the chance of low-weight baby birth at the time of birth was 1.6 times as much as that of healthy mothers [32]. This study found a significant relationship between baby height and head circumference in mothers having pre-eclampsia. Many studies on the same issue have echoed this finding [14,20]. Though the protocol of pre-eclampsia office is different in many studies, it seems that neonatal parameters are closely related to pre-term delivery rate.

Sibai et al. also observed that babies given birth by the pre-eclampsia mothers more needed to be kept in NICU. The difference was seen more among the term babies (more than 37 weeks of pregnancy) than among pre-term delivered babies [29]. Burgez et al. in the US also showed that there was a pressing need to the NICU [15]. Regarding the pre-eclampsia mothers' need, it seems logical to put an end to emergency and pre-term pregnancy types. Saadat et al. examined 190 ladies with or without pre-eclampsia through clinical observation in Bandarabbas and found no significant relationship [33]. The inconsistencies in findings seem to be attributable to the sampling environment and method of data analysis.

Conclusion

Given the diverse consequences of pre-eclampsia for mothers and newly born babies in Mosavi Hospital of Zanjan Province (including preterm, possibility of caesarean delivery, and the need to keep baby in the newborn intensive care unit) as well as the mortality of both mothers and babies, it seems that the type of management of pre-eclampsia in hospitals should be carefully investigated and critically examined. Furthermore, to prevent unfavorable outcomes of pre-eclampsia, it would be wise to adopt adequate programs for those offering healthcare services to the pregnant women in pre-delivery and pre-natal care phases. Further research is recommended to use accessible data and recorded files of the patients. Thus, more clinical studies are warranted in this area.

Conflict of interest

There is no conflict of interest to be declared

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