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Risk Factors of Premature Infants in the Rural Areas of Azadshahr City: a Case-Control Study

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Abstract

Background*:** Preterm birth is one of the most remarkable reasons for neonatal and infant mortality and morbidity across the world. This study aimed to determine risk factors of premature infants in the rural area of Azadshahr city, Iran. ***Materials and Methods*:** A case-control study was conducted on all premature and low birth neonates (less than 37 weeks and weight less than 2500 grams). Data were collected by records in 30 health houses located in the rural areas of Azadshahr city durring 2013 to 2016. Two groups (case and control) were matched by gender and health houses. A trained midwife was collected data by using of a researcher-made checklist. To describe mean and standard deviation of the demographic characteristics, descriptive methods were used. To analyze, inferential statistic tests such as Chi- square, and independent t-test were implemented through SPSS (version,16). Significant level was also taken <0.05. ***Results*:** In total, 112 girl infant and 101 boy infant were explored. The mean age of mother in the case and control groups was 26.14± 8.4 and 25.67± 9.1 years old respectively. There was a significant difference between the two groups in terms of prenatal care and pregnancy complications. In addition, a remarkable relations was found between polytocous and delivery time (P<0.05). ***Conclusion: Providing mothers with necessary information in terms of interval between births, and the importance of prenatal cares in the pregnancy period to prevent complication seems to be likely useful.

Key Words: Fetus, Infant, Premature, Pregnancy, Prenatal care, Risk factors.

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1- INTRODUCTION

Preterm birth accounts for infant mortality, childhood morbidity, and also adult morbidity (1). Infant mortality rate is also one of the most important indicators of the each countries health. According to the World status, 60 to 80 percent of infant deaths that are not associated with congenital abnormalities, are caused by premature baby (2). Children mortality rate (under 5 years) accounts for a remarkable percentage of total deaths in third world countries (3). Prematurity or gestational age less than 37 weeks has a major impact on health worldwide (4). Preterm birth is related to 5 to 18% of pregnancies and also is a major cause of infant morbidity and mortality (5). Associated factor with early preterm is categorized as maternal, fetal risk factors (6). Late preterm infants are more at risk of death and complications than term infants (7).

Despite of improvement in the medical care services, mortality rate is yet remarkable among preterm and very low birth weight infants (8). About 14.9 million births are preterm per year across the world (9). Approximately, 99% of neonatal deaths happen in low- and middle-income countries (10). Numerous studies presented preterm prevalence of 1.3 to 11.9 % in Iran (11). Preterm birth is known as a multi-factorial problem and also risk factors for early and late preterm births may differ (7).

Preterm rupture of membranes (PROM) and preterm premature rupture of membranes (PPROM) are preterm critical causes and accounted consequently for its early and late complications. Preterm birth increase incidence of the most neonatal disease that hyaline membrane disease or respiratory distress syndrome and bleeding into the brain tissue are more highlighted and are essential reasons of neonatal diseases. However, in terms of preterm, the incidence of cesarean delivery is usually more. Hyaline membrane disease has primarily seen in premature infants and its occurrence is inversely related to gestational age and birth weight. As, it has approximately seen 60, 80, 15 and 5 percent in gestational age less than 28 weeks, 32 weeks, 36 weeks and 37 weeks, respectively and also never observed in mature (12, 13). The numerous risk factors are known for preterm including demographic (mother age less than 17 and more than 35 are more at risk), race (black race is more at risk compared to white race), low socio- economic level and malnutrition caused by that, inadequate care during pregnancy (that are associated with a higher incidence of premature deliveries), mother behavior (such as smoking), Maternal weight gain during pregnancy (It has confirmed that premature delivery occurs more frequently in women with BMI lower 19.8), previous gestational history (a preterm delivery and two preterm delivery is associated with increase of 3 and 6 fold, respectively), history of previous abortion and multiple pregnancies (It is also at higher risk of preterm delivery), complications of current pregnancy (vaginal bleeding in the first and second trimester caused by placenta previa and abruption, preeclampsia and diabetes are in accordance with more preterm prevalence) infection (reported 25 percent in preterm as chorioamnionitis the current pregnancy) and vaginitis (bacterial vaginitis reported 40 percent in the preterm), in brief (14). Since prematurity and infant mortality is high in the Azadshahr city; therefore, we decided to investigate the risk factors of premature infants in the rural area of Azadshahr city, Iran.

2- MATERIALS AND METHODS

2-1. Study design and population

A case-control study was conducted on all premature and low birth neonates (less than 37 weeks and weight less than 2,500

gram). Data were collected by records in 30 health houses located in the rural area of located in North of Iran Azadshahr city during March 2013 to June 2016. The study protocol was confirmed by Research Committee of Golestan University of Medical Science. Data were collected by a trained interviewer (expert of midwifery).

2-2. Methods

The interviewer provided by education about survey aim, goals and objectives, samples, how to complete the checklist, how to select case and control group based on mothers and children documents. Midwifery was recruited to fill out the questionnaires. To gather information, existed documents such as continuous care and family records were used.

After comparison of the first day of the last menstrual and the actual date of delivery, eligible cases (women who delivered prematurely) were extracted and analyzed. Prior to the study, all health workers (who had access to records) were told that the current findings would be confidential. The purpose of the study was also explained to them. According to pilot estimates of existed records, about 140 premature and low birth infants could be available in all 30 health houses of Azadshahr city. Then, all preterm deliveries (both under and upper 2,500 grams) in health houses were selected as cases and normal labors (that born after 37 weeks) were considered as controls such that a health houses with 20 deliveries in the three years that three of them were prematurely delivered, 17 remained was divided by 3 to determine the interval of samples (records), which we considered 5 as records interval. The first control sample was the first registered name in the mother record, the second record numbered 6, and the third record numbered 11 and so on. In general, 116 and 97 infants were considered in the case and control groups. Two groups were matched based on gender and health houses records.

2-3. Measuring tools

Data was collected using a researcher-made checklist comprising gender of infant, age of mother, education status, blood type of mother, ethnicity, Body Mass Index (BMI), history of preterm delivery, type of delivery, hemoglobin of mother less than 11, diabetes and complications during pregnancy. The checklist was filled out by checking family records by a trained midwife.

2-4. Inclusion criteria

Inclusion criteria were as follow;

1. delivery before 37 weeks of pregnancy (Preterm birth, considered as birth before 37 weeks gestation) (15), **2**. living in village, and 3) receiving full cares.

2-5. Exclusion criteria

Exclusion criteria were: **1.** family immigration, **2.** incomplete records, and 3) guests (such as Afghan refugees).

2-6. Statistical analyses

Descriptive analysis was carried out to describe the mean and standard deviation (SD) of the demographic characteristics. To analyze, Chi- square test was implemented to assess of two qualitative variables. In addition, independent t-test was conducted to test the association of premature and mature variables. In final, SPSS statistical software version 16 was utilized. Significant level was taken <0.05.

3- RESULTS

In total, 112 girl infants (58 and 54 in the case and control groups, respectively) and 101 boy infants (58 and 43 in the case and control groups, respectively) were explored. Male and female infants were not significantly different in terms of preterm of Low birth weight (LBW) (P=0.385). The mean age of mother in the

case and control groups was 26.14± 8.4 and 25.67 ± 9.1 years, respectively. Moreover; 43.2 % and 56.8 % of infants were born prematurely and naturally from mothers who had no complications in the pregnancy; while, 56.7% of premature infant and 43.3 % of natural infants were born from mothers who had complications in the pregnancy period. In total, from 95 infants of mothers with urinary tract infection, 51.7 % were prematurely born. In addition, from 11 (5.16 %) infants of mothers with diabetes, 55.2 % were premature, as well.

Table.1 delineates that there was no difference between two study groups in terms of gender, ethnicity, mother education, BMI, blood type of mother, type of delivery, history of preterm delivery and hemoglobin of mother less than 11 (32).

The average of prenatal care in mothers having premature and mature infants was 6.08 ± 0.19 and 7.41 ± 0.18 times, respectively. Independent t-test presented a significant relation between the two groups (premature and mature) (P= 0.001) (**Table.2**). Table.2 shows a statistical significant relation between preterm and complications using Chi- square test (P=0.037). Chi- square test showed that there was no significant relation between diabetes and pregnancy period (P= 0.073). To survey the effect of mother urinary infection on delivery time, Chi- square test showed that there was no remarkable relation between the mother urinary infection and delivery time (P= 0.261).

Results revealed that 201 (94.4%) infants who had not abnormality or their mothers had not a history of abnormal birth were 54.2 % premature and 12 infants that were abnormal or their mothers had a history of abnormal delivery were 76.1 % premature. Chi- square test showed that there was no a significant relation between the infant abnormality and history of abnormal birth in terms of previous infants and delivery time (P= 0.411). In terms of singleton, 187 (87.8%) cases were studied that 54.2 % and 45.8 % were premature and mature, accordingly. Moreover, regarding 26 studied polytocous, 84.2 % and 15.8% were premature and mature, respectively. Chi –square test showed that there was a significant relation between the polytocous and delivery time (P= 0.021) (**Table.2**).

4- DISCUSSION

At present study, Chi-square test indicated that infants were similar in gender regarding preterm or Low Birth Weight (LBW) status that was in relevance with a study carried out in Sabzevar city of Iran such that no a significant association was found between neonatal gender and birth priority with Very Low Birth Weight (VLBW) and Extremely Low Birth Weight (ELBW). This difference can be caused by this reason that in our study we investigated infants with LBW; while, in Sabzevar survey, VLBW and ELBW were explored (16). Nevertheless, a study implemented in Japan reported that female gender was more at risk of LBW (17). Moreover, LBW infants were more at risk of preterm birth (18).

In Khadem et al. study the prevalence of preterm delivery in patients with preeclampsia was more in cases than controls and a significant association was observed in gestational age in the two groups, as well (18). In addition, in a study done in Sabzevar city, VLBW and ELBW were significantly in line with prenatal difficulties (16).

Garshabi and Fallah study delineated that women with severe anemia were significantly faced by increased risk of low birth weight and preterm delivery compared the women with normal hematocrit (19). In Tandu-Umba study, anemia of mother worsen the risk of mortality of children (20). Diabetes was another complication of pregnancy that

was not effective in terms of preterm in our study that can be likely caused by small number of infants whose mothers had diabetes. In Mokhtari et al. study, prevalence of diabetic mothers with preterm delivery was approximately two times higher, but not statistically significant (21). In Zayni survey, pregnancy complications such as gestational diabetes and hypertension during pregnancy was significantly associated with preterm delivery (22). The findings of this study showed that maternal age and preterm birth was not statistically significant. Fadaie et al. survey indicated that gestational age was not associated with preterm birth (23), whereas in Sohrabi and Ghanbari survey (24), mother age was a vital factors affecting preterm labor which may be due to appropriate training in before pregnancy care in Azadshahr, Iran. A study conducted on North West province of Iran reported that higher maternal chronological age was associated with low birth weight (25).

At current study, maternal education was not essential factors about delivery time that was in relevance with Chiabi et al. findings (26); although, Rajaie Fard et al. found conflicting results (27). The most preterm, in the current survey, was in type A blood 66 %; however, it was not statistically meaningful. In Davari Tanha et al. study, there was a significant association between the type A blood and preterm (28). This disparity may be likely formed by variation of blood type in each area. The most preterm women had body mass index (BMI) as overweight or obese; however, it was not remarkable. Doherty and et al. presented some of the adverse outcomes of pregnancy in women with BMI higher than normal. Furthermore, risk of preterm birth in women with BMI higher than normal and morbid obesity did not increased compared with women with a normal body mass index (29). In a study entitled predictors of low birth weight infants in the North West province of Iran, maternal weight prior to pregnancy were significant predictors of LBW (25). Nematzadeh et al. survey showed that the rate of preterm birth in women with BMI above the normal range was significantly higher than the women with normal BMI and lower than normal; however, the mother weight before and during pregnancy has maternal and fetal outcomes (30, 31).

In addition, recommendation for getting weight may not be useful for all mothers and their infants, and long-term investigations should be performed on pregnant women and their babies until more favourable recommendations achieved for promoting pregnancy outcomes. In the current survey, there was not a significant association between the urinal infection and delivery time. In Chiabi et al. study, the odds of prematurity was increased because of a urinary tract infection (26). This difference can be attributed to high rate of urinal infection that necessitates essential training to prevent urinal infection.

At present study, 62 % of mothers with preterm pregnancy had haemoglobin lower than 11 that were not statistically significant. In Hajian et al. investigation, risk of low birth weight and preterm birth increased by hemoglobin less than 10 (31). In terms of ethnicity, there was not a significant association between infant ethnicity and delivery time. Lo et al. survey conducted in Taiwan identified a significant relation between the ethnicity and delivery time (33), Abubakari et al. also cited the significant effect of ethnicity (34) that may be caused by different ethnicity in the two countries.

At present study, the rate of vaginal and cesarean delivery was approximately equal in the two groups (case and control groups) that may be because of either greater pregnancy complications in

Azadshahr city compared to other area of Golestan province or determining delivery method based on mother status. In Namakin et al. study, the odds of premature birth in cesarean deliveries were 3.34 times compared to normal deliveries (2). The rate of cesarean section in Iran was reported 26% up to 60% compared to some private centers which was presented up to 87% (35). History of malformed infants delivery was also not effective on delivery time. It is recommended that, in the future exploration, malformed infants more study accurately. Considering pivotal fetal factors, polytocous was highlighted that in our survey 84.2% considering 19 twain were born prematurely. In Congo, multiple pregnancies was related to the prematurity (36). Ra¨isa¨nen et al. also stated the remarkable effect of multiple pregnancy on polytocous (15).

5- Limitations Of the study

At present, premature and mature infants in the rural area were only investigated; in addition, some data of mothers and infants were lost that may limit the generalizability of the results beyond these records.

6- CONCLUSIONS

The number of twin, complications, and prenatal cares were remarkable factors affecting the preterm birth; therefore, providing mothers with necessary information in terms of interval between births, and the importance of prenatal cares in the pregnancy period to prevent complication appeared to be likely beneficial.

7- CONFLICT OF INTEREST: None.

8- ACKNOWLEDGMENTS

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Table-1: Demographic information of samples in the control and case groups

Variable		Group				Total		P- value
		Control		Case				
		Number	Percent	Number	Percent	Number	Percent	
Gender	Female	54	48.2	58	51.8	112	100	0.385
	Male	43	42.6	58	57.4	101	100	
	Total	97	45.5	116	54.5	213	100	
Ethnicity	Fars	23	44	30	56	53	100	0.761
	Turk	24	48	26	52	50	100	
	Turkmen	23	49	24	51	47	100	
	Sistani	14	43	19	57	33	100	
	Baloch	13	44	17	56	30	100	
	Total	97	46	116	54	213	100	
Mother education	Illiterate	15	58	11	42	26	100	0.405
	Primary school	17	36	31	64	48	100	
	Middle school	26	48	29	52	55	100	
	High-school and upper	39	47	45	53	84	100	
	Total	97	46	116	54	213	100	
BMI	Normal	52	53	47	47	99	100	0.513
	Thin	12	39	19	61	31	100	
	Obese	11	35	21	65	32	100	
	Overweight	22	44	29	56	51	100	
	Total	97	46	116	54	213	100	
Blood type of mother	O	41	52	39	48	80	100	0.367
	B	25	57	29	43	44	100	
	A	19	34	38	66	57	100	
	AB	12	50	12	50	24	100	
	Total	97	46	116	54	213	100	
Type of delivery	Natural childbirth	51	46	61	54	112	100	0.716
	Caesarean section	46	46	55	54	101	100	
	Total	97	46	116	54	213	100	

History of preterm delivery	No	91	47	103	53	194	100	0.484
	Yes	6	32	13	68	19	100	
	Total	97	46	116	54	213	100	
Hemoglobin of mother less than 11	No	74	48	82	52	156	100	0.512
	Yes	20	38	33	62	53	100	
	Total	97	46	116	54	213	100	

Table-2: Significant variables of fetal risk factors in the case and control groups

Variables		Groups				Total		P-value
		Case		Control				
		Number	Percent	Number	Percent	Number	Percent	
The number of twin	Singleton	88	54	75	46	163	100	0.021**
	Polytocus	28	56	22	44	50	100	
Total		116	54.5	97	45.5	213	100	
Complications	Yes	57	53.3	50	46.7	107	100	0.037**
	No	59	55.6	47	44.4	106	100	
Total		116	54.5	97	45.5	213	100	
Number of prenatal care		Number	Mean	Number	Mean	Standard deviation		0.001*
						Case	Control	
		116	5.4330	97	7.0482	0.1464	0.1877	

** Chi-square test, * Independent t-test.