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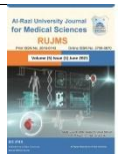

A comparative Study of Feto-Maternal Outcome Among Preterm Primigravida and Multigravida Attending Al Sabeen Hospital, Sana'a City–Yemen

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Abstract:

Background: Preterm labor, defined as birth occurring prior to 37 weeks gestation, is a serious obstetric problem, and it is associated with significant neonatal morbidity and mortality. **Aims**: To determine Feto-Maternal outcome among Primigravida and Multigravida Attending Al Sabeen Hospital, Sana'a –Yemen. **Patients and Methods**: A retrospective observational registry was conducted at the maternity unit of Al Sabeen Maternity and Childhood Hospital Sana'a City, Yemen during a period 1st January 2021 till 30th June 2021. All consecutive patients were included for the study and data were collected from record book of labor room and discharge book from statistic department. **Results**: The prevalence of preterm labor was 6.4% at the maternity unit of Al Sabeen Maternity and Childhood Hospital Sana'a, Yemen during six months. Incidence of spontaneous preterm labor was 42.8%. Median age of primiparous was 20 (16-40) years, and median age of multiparous pregnancies was 28 (20-45) years. Majority (48.5%) of primiparous belonged to age group (20-25) years, while majority of multiparous (34.2%) belonged to age group (> 30) years. Only 9.1% pregnancies were multiple pregnant. The most common causes of preterm labor were abnormal amniotic fluid volume in (34.7%), pregnancy induced hypertension in (14.8%), placental abnormalities in (8.1%), placental Previa in (4.4%) and polyhydramnios in (3%). Median primiparous and multiparous infant birth weight were 1.8 (0.9-3.1) and 1.7 (0.8-3.1) kg respectively. There were significant differences between primiparous & multiparous groups in age, and educational level and outcome of fetal gender. Fetal of mother who belonged to age groups (26-30) and (> 30) years, vaginal deliveries, and with early preeclampsia pregnancies were significantly 3.1, 3.4, 2.1, and 2.2 times higher risk of death respectively, while singletons were 6 times higher risk of death, but without statistically significant relationship. **Conclusion and recommendations**: The prevalence of preterm labor was high at the maternity unit of Al Sabeen Maternity and Childhood Hospital Sana'a, Yemen. Compared with multiparous group, primiparous group showed significant lower age, and higher level of education. Older maternal age, vaginal deliveries and early preeclampsia were independent predictors of fetal mortality among preterm labor pregnancies. Women should be educated and counselled about preterm labor so that they can seek proper medical care to avoid adverse pregnancy outcomes in future and they should have access to good quality antenatal care.

Keywords: Preterm**,** Labor, Primigravida, Multigravida, Al Sabeen Hospital, Sana'a, Yemen.

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Introduction

Preterm labor, defined as a birth that occurs before 37 weeks gestation, is a critical obstetric condition that affects 11% of all pregnancies globally and is linked to significant neonatal morbidity and mortality [(1)].

Together with birth weight, gestational age at birth is increasingly accepted as a reference standard for the outcome and prognosis of preterm infants. Mild prematurity is defined as birth occurring between 32 and 36 weeks of gestation, which can be further split into mild (32-33 weeks) and moderate (34-36 weeks) preterm delivery. In Canada, the vast majority (85%) of premature labors are due to mild prematurity. Birth at 28-31 weeks' gestation is defined as very preterm and accounts for less than 1% of all deliveries. Immediate survival is expected with a significant proportion of short to long-term morbidity. Below 28 weeks is regarded as extremely preterm (less than 5% of all preterm births) where early neonatal mortality is high with up to 50% of severe handicaps occurring among survivors born below 26 weeks [(2)].

Preterm labor is considered a syndrome that can be initiated by multiple mechanisms such as intrauterine infection and inflammation, uteroplacental ischemia and hemorrhage, uterine over distension, cervical insufficiency, hormonal disorders, and other immunologically mediated processes [(3)].

In accordance with the Millennium Development Goals, two-thirds of all under-five deaths should be reduced [(4)], thus identification of the reasons associated with premature birth explains the importance of health planning. Unfortunately, and as my knowledge, there have been no study in Yemen to identify preterm delivery associated risk factors which could be extended elsewhere. So doing study to detect risk factors of preterm labor in Yemen can be helpful in the prevention and health programming. Therefore, this study aimed to study Feto-Maternal outcome among primigravida and multigravida attending Al Sabeen Hospital, Sana'a – Yemen.

Patients and Methods

This study is a retrospective observational registry at a single hospital (Al Sabeen hospital, Sana'a City, Yemen). This hospital is one of the largest public, and referral center in the country. It receives all obstetric emergency cases referred from different locations. The department of obstetrics and gynecology has all facilities that serve the patients, including blood bank, laboratory, and a well expertise stuff. The Obstetrics and Gynecology Department have both outpatient and inpatient services. The Obstetrics and Gynecology Department has a gynecology ward, an antenatal care unit, a family planning unit, a labor room, and a postnatal ward. Both Primiparous and multiparous preterm labor and between 25th and 36th weeks of gestation were included. During six months (from 1st January 2021 till 30th June 2021) data was collected using predesigned questionnaire and by review of hospital records. It comprised a preliminary step of collecting all preterm labor. In the next step, patients less than 25th and more than 36th weeks of gestation, with non-viable pregnancy or ectopic pregnancy, and those with incomplete or missing hospital chart were excluded from analysis. Data collection was based on retrospective chart review, hence informed consent was not required. In addition, hospital's institutional review boards gave its approval to this study.

Statistical analysis

South Texas Art Therapy Association 16.0 software (Stata® 16.0) was used for statistical analysis of this data. A Shapiro–Wilk test confirmed that all the data were not normally distributed. Therefore, Mann-Whitney U test was used for comparison, and quantitative data were stated as the median with data range (minimum to maximum). Chi-square test was used to compare between categorical variables; whenever any of the expected values were less than 5, Fisher's exact test was used instead. All variables showing significant associations with the univariate analysis were fitted into multiple logistic regression models to determine the independent predictors of all domains. Multicollinearity between independent variables was checked with standard error, and model fitness was assessed using Hosmer and Lemeshow goodness of fit test. All used statistical tests were performed at a 5% level of significance.

Results

During first six months in 2021, there were 4732 deliveries in Al Sabeen Hospital (2905 Vaginal vs 1727 Cesarean). Out of them, 304 women were with preterm labor. Accordingly, the prevalence of preterm labor was 6.4%. Out of 304 preterm labor women, there were 7 women with congenital abnormalities fetuses and then excluded. Therefore,

final sample size were 297 preterm labor women. Primiparous and multiparous preterm labor women were 101 (34%) and 196 (66%) respectively. Primiparous median gestational age at preterm labor was 31 (23-35) weeks, while multiparous median gestational age at preterm labor was 32 (21-38) weeks.

Spontaneous Preterm labor:

In this study, 170 (57.2%) of the preterm births were induced, while 127 women (42.8%) of the preterm births were due to spontaneous preterm labor. Figure 1.

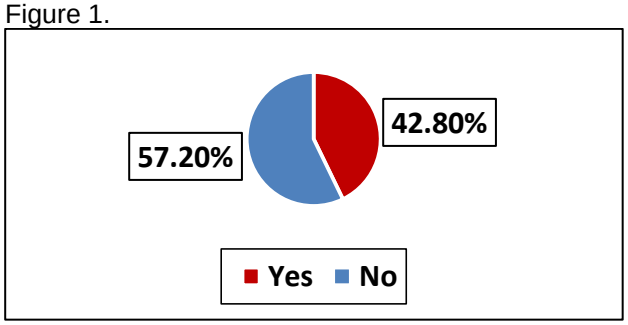

Figure 1: Spontaneous preterm labor.

Causes of preterm labor

In figure 2, the most common causes of preterm labor were Abnormal Amniotic Fluid Volume (AAFV) in (34.7%), Pregnancy Induced Hypertension (PIH) in (14.8%), placental abnormalities in (8.1%), placental Previa in (4.4%) and polyhydramnios in (3%).

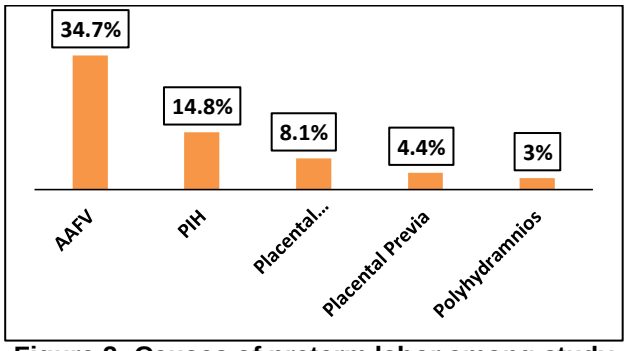

Figure 2: Causes of preterm labor among study participants.

Maternal Sociodemographic characteristics

Median age of all participants was 25 (15-45) years. Median age of primiparous was 20 (16-40) years, while median age of multiparous was 28 (20-45) years. As shown in table 1, majority 49 (48.5%) of primiparous belonged to age group (20-25) years, followed by 37 (36.6%) women belonged to age group (< 20) years, and then 8 (7.9%) and 7 (6.9%) belonged to age groups (26-30) years, and (> 30) years respectively. Majority of multiparous 67 (34.2%) belonged to age group (> 30) years, followed by 61 (31.1%) belonged to age group (20-25) years, and then 50 (25.5%), and 18 (9.2%) belonged to age groups (26-30) years, and (< 20) years respectively. Majority 61 (60.4%), and 108 (55.1%) of primiparous and multiparous belonged to urban. In figure 4-4, while majority 66 (65.3%) of primiparous were educated, majority 115 (58.7%) of multiparous non-educated. There were significant differences between primiparous & multiparous groups in age (p-value = 0.000), and in educational level (p-value = 0.000).

Table 1: Demographic variables compared Primiparous & Multiparous groups

Demographic characteristic	Primigravida (N=101) No. (%)	Multigravida (N= 196) No. (%)	P-value
Maternal age (Years)			
< 20	37 (36.6)	18 (9.2)	**0.000***
20-25	49 (48.5)	61 (31.1)	
26-30	8 (7.9)	50 (25.5)	
> 30	7 (6.9)	67 (34.2)	
Median maternal age (range)	20 (16-40)	28 (20-45)	
Residence			
Urban	61 (60.4)	108 (55.1)	0.383
Rural	40 (39.6)	88 (44.9)	
Educational level			
Educated	66 (65.3)	81 (41.3)	**0.000***

Non-educated	35 (34.7)	115 (58.7)	

*Indicates significant result.

Labor outcome

From total labor outcomes in table 2, the only statistically significant difference between primiparous & multiparous groups was in fetal gender (p-value = 0.048).

Table 2: Labor outcomes compared between Primiparous & Multiparous groups.

Outcomes	Primigravida (N=101) No. (%)	Multigravida (N= 196) No. (%)	P-value
Fetal gender			
Male	67 (66.3)	109 (55.6)	**0.048***
Female	34 (33.7)	87 (44.4)	
Fetal Birth Weight			
Normal Birth Weight	12 (11.9)	19 (9.7)	0.559
Low Birth Weight	89 (88.1)	177 (90.3)	
Fetal Malposition			
Yes	10 (9.9)	26 (13.3)	0.400
No	91 (90.1)	170 (86.7)	
Neonatal viability			
Alive	87 (86.1)	158 (80.6)	0.235
Dead	14 (13.9)	38 (19.4)	

***Indicates significant result.**

Maternal outcome: Table 3 shows, there were no significant differences between primiparous & multiparous groups in all maternal outcomes (p-value > 0.05).

Table 3: Maternal outcome compared between Primiparous and Multiparous groups.

Outcomes	Primigravida (N=101) No. (%)	Multigravida (N= 196) No. (%)	P-value
Chorioamnionitis			
Yes	5 (5)	7 (3.6)	
No	96 (95)	189 (96)	0.387
Eclampsia or sever preeclampsia			
Yes	13 (12.9)	32 (16.3)	0.431
No	89 (87.1)	164 (83.7)	
Maternal Hemodynamic Instability			
Yes	4 (4)	14 (7.1)	0.205
No	97 (96)	187 (92.9)	

Fetal mortality factors compared between alive & dead fetal groups:

Table 4 shows there were statistically significant differences between alive & dead fetuses in maternal age (p-value = 0.004), mode of delivery (p-value = 0.026), PET (p-value = 0.045) and type of pregnancy (p-value = 0.031).

Table 4: Fetal mortality factors compared between alive and dead fetuses.

Variables	Alive (N=245) No. (%)	Dead (N= 52) No. (%)	P-value
Maternal age (Years)			
< 20	49 (20)	6 (11.5)	**0.004***
20-25	99 (40.4)	11 (21.1)	
26-30	42 (17.1)	16 (30.8)	
> 30	55 (22.4)	19 (36.5)	
Residence			
Urban	137 (55.9)	32 (61.5)	0.457
Rural	108 (44.1)	20 (38.5)	
Educational level			
Non-educated	121 (49.4)	29 (55.8)	0.403
Educated	124 (50.6)	23 (44.2)	
Mode of delivery			
Vaginal	162 (66.1)	42 (80.8)	**0.026***
Cesarean	83 (33.9)	10 (19.2)	
PE			
Early PE	22 (9.0)	10 (19.2)	**0.045***
Late PE	39 (15.9)	4 (7.7)	
No PE	184 (75.1)	38 (73.1)	
Type of pregnancy			
Multiple	26 (10.6)	1 (1.9)	**0.031***
Single	219 (89.4)	51 (98.1)	
Fetal gender			
Male	144 (58.8)	32 (61.5)	0.713
Female	101 (41.2)	20 (38.5)	
Fetal Birth Weight			
Normal	28 (11.4)	3 (5.8)	0.168
Low	217 (88.6)	49 (94.2)	

*Indicates significant result.

Predictors of fetal mortality factors

Table 5 shows logistic regression analyses predicting possible risk factors for fetus mortality (event). Risk for event in fetus in preterm labor women who belonged to age groups (26-30) and (>30) years were 3.1 and 3.4 times higher compared to preterm labor women who belonged to age group (20-25) years respectively (OR = 3.1, 95% CI= 1.38-7.00, OR = 3.4, 95% CI= 1.46-8.00 respectively), whereas there were no significant differences for fetal event between preterm labor women who belonged to age group (< 20) years and who belonged to age group (20-25) years (p-value = 0.856). Risk for event in fetus in preterm labor women who belonged to age groups (26-30) and (>30) years slightly decreased after adjusting for confounders compared to the unadjusted risk (OR = 3.0, 95% CI= 1.32-7.14, OR = 3.3, 95% CI= 1.43-7.92 respectively).

Risk for event in fetuses of vaginal preterm labor women was nearly 2 times higher compared to cesarean preterm labor women (OR = 2.1, 95% CI= 1.02-4.50). This risk increased after adjusting for confounders compared to the unadjusted risk (OR = 3.2, 95% CI= 1.34-7.78).

Our study data showed nearly an increased risk for fetus event in preterm labor women who had early PE (OR = 2.2, 95% CI= 0.94-5.023), but no significant differences for fetal event between preterm labor women who had late PE and those with no PE (p-value = 0.207). After adjusting for confounders significant differences between

preterm labor women who had early PE (p-value = 0.061).
In both unadjusted and adjusted analysis, compared with fetuses of multiple pregnancies, singletons have 6 times higher risk of event, but this difference was without statistically significant (p-value > 0.05).

Table 5: Logistic regression analyses predicting factors for fetal event

Predictors of mortality in Fetus		Unadjusted			Adjusted		
		OR	95% CI	P- value	OR	95% CI	P-value
Maternal age (Years)	< 20	1.1	(0.38-3.15)	0.856	1.1	(0.38-3.17)	0.850
	20-25	Reference			Reference		
	26-30	3.1	(1.38-7.00)	**0.004***	3.0	(1.32-7.14)	**0.009***
	> 30	3.4	(1.46-8.00)	**0.006***	3.3	(1.43-7.92)	**0.005***
Mode of delivery	Vaginal	2.1	(1.02-4.50)	**0.042***	3.2	(1.34-7.78)	**0.009***
	Cesarean	Reference			Reference		
PE	Early PE	2.2	(0.46-5.023)	**0.014***	2	(0.19-1.03)	0.061
	Late PE	0.49	(0.16-1.47)	0.207	0.4	(0.15-1.40)	0.207
	No PE	Reference			Reference		
Type of pregnancy	Single	6	(0.80-45.6)	0.081	5.9	(0.77-45.3)	0.086
	Multiple	Reference			Reference		

*Indicates significant result.

Discussion

Preterm labor is the leading cause of neonatal mortality and a substantial portion of all birth-related short- and long-term morbidity [5].
In our study, the prevalence of preterm labor was 6.4%. This is close to 6.7% reported in the secondary data analysis conducted by the WHO in 359 health facilities from 29 countries in Africa, Asia, Latin America, and Middle East [6]. This is far less than the 21.7% gotten from a Brazilian study, but more than the 5.1% reported by a study done in Iran as showcased in [7, 8] respectively. The prevalence of preterm delivery in this study was also found to be higher than the 4.7% which is reported in a study done at National Ribat University Teaching Hospital, North Sudan [9], and slightly lower than the 7.1% reported in Saudi Arabia [10]. The reason for these differences between studies is not clear, but individual ethnicity, socioeconomic disadvantage and living in ethnically dense areas have been potentially linked to the risk of preterm births [7, 8, 11].
As 57.2% of the preterm births were induced, while 42.8% followed spontaneous preterm labor. This is different from that reported in Nigeria of which 46.5% of preterm births were induced while 25.2% followed spontaneous preterm labor and 28.1% were preterm premature rupture of membrane [12]. This finding also differ from a previous study in Iceland, that reported an iatrogenic preterm birth rate of 2.40% [11]. But in this study, it showed that the iatrogenic causes accounted for most of the preterm delivery. In these studies [6, 11], the increase in iatrogenic preterm births even remained significant after adjusting for medical indications, suggesting that other factors might be affecting the rising trend. Although, our study result is lower than result of meta-analysis from the different regions in the world as spontaneous preterm labor is responsible for more than half of preterm births [13], it is higher than the frequency of preterm births in the USA which was about 12–13% and 5–9% in many other developed countries; however, the rate of preterm birth has increased in many locations, predominantly because of increasing indicated preterm births and preterm delivery of artificially conceived multiple pregnancies [14].
Based on our study findings, the most common causes of preterm labor were AAFV, PIH, abruptio placenta, placental Previa and then polyhydramnios respectively. Common reasons for indicated preterm births include pre-eclampsia or eclampsia, and intrauterine growth restriction [14]. In China, nearly two thirds of all preterm births were attributable to maternal, fetal, or placental conditions, and one third had unknown etiology [15].
Not surprisingly, there were significant differences between primiparous & multiparous groups in age and in educational level, as these results were reported by previous studies [16, 17]. While

chronologic age per se may not be a good predictor of pregnancy outcome, adolescents remain a high-risk group because of factors that are more common among them (e.g., biologic immaturity, inadequate prenatal care, poverty, minority status, low prepregnancy weight) and because factors associated with an early adolescent pregnancy, such as low gynecologic age, may continue to influence the outcome of subsequent pregnancies [18].

According to our study data, majority of preterm labor women belonged to multiparity (66%) and only 34% of women who had preterm labor belonged to primiparity group. In India, majority was primiparous (67.3%), while multiparous group was (22.7%) [16].

Compared between multiparity and primiparity, there were no significant differences in causes of preterm labor and in maternal outcomes. ***Kaur and Kaur*** found primiparity had a higher tendency to have PIH (15.38%), Intrauterine Growth Retardation (19.23%), Fetal Distress (19.23%) and oligohydraminos (17.30%) in a comparison to multiparous group women [16].

Our study found the rate of Emergency Cesarean Section (33.9%) was higher in primiparity as compared to multiparity (19.2%). This result goes with ***Kaur and Kaur*** who found the rate of Emergency Cesarean Section (65.51%) was higher in primiparity as compared to multiparity (41.66%) [16].

Inconsistent with Indian study, there were statistically significant differences between primiparous & multiparous groups in fetal gender [17].

Our study result goes with national figures from Sweden which showed that boys are more likely to be delivered prematurely [19].

In this study, multiple pregnancies were seen more in multigravida as compared to primigravida. This is inconsistent with another Indian study that found twins were seen more in multigravida (70.7%) as compared to primigravida (29.3%) [20].

Based on our study findings, the number of LBW babies was similar between primiparity and multiparity groups. This is inconsistent with ***Kaur and Kaur*** who found the number of LBW babies was higher in primiparity (55.76%) when compared to multiparity (35.41%) [16].

Consistent with our finding, a study in Pakistan found that parity and fetal weight had an insignificant effect on perinatal mortality [21]. But, a recent study in Ghana found neonatal deaths were influenced by proximal factors including parity [22]. A study conducted in 12 European countries found prevalence of primiparae (41–50%) characteristic had a significant association with neonatal mortality [23]. Primiparity was associated with a significantly increased risk of low birthweight compared with multigravida [24].

According to our study data, infants of older mother age groups were at higher risk of neonatal mortality. It goes with results of that study conducted in 12 European countries, where mothers over age of 35 years had a significant association with fetal mortality [23]. However, evidence from 45 low and middle income countries where the risk of fetal mortality in all regions was markedly greater for infants with mothers under 16 years old [25]. In addition, a recent study in Nepal found fetuses born to mothers aged 12 to 15 years were at a higher risk of fetal mortality than those born to women aged 20 to 24 years (OR = 2.24) [26].

In our study, fetal gender had no significant relationship with mortality. This is in disagreement with Swede study as fetal deaths were more common among boys [19]. The release of catecholamines during labor is an important defense mechanism by a hypoxic fetus. Preterm females have significantly higher catecholamine levels than males, which may explain the better outcome in females after a hypoxic event [19].

Our study data showed no statistically significant association between LBW and fetal mortality. The excess of fetal mortality could not be explained by the effect of maternal characteristics or complications or by differences in birth weight or gestational age. It is suggested that the conditions under which the operation was performed probably explain the increased risk of early fetal death [27]. ***Bobadilla and Walker*** found babies of normal birth weight (≥2500 gm) delivered by cesarean section were 2.5 times more likely to die in the early neonatal period compared with vaginally delivered babies of the same weight [27]. In Southern Ethiopia, one of predictors of fetal mortality was fetuses born by cesarean section [28]. These are inconsistent with our study results, as fetuses of vaginal preterm labor women were at higher risk for mortality compared to fetuses of cesarean preterm labor women. It goes with a recent study which found cesarean delivery was inversely correlated with fetal mortality rate [29]. In addition, according to an Ecological Study in Low-, Medium-, and High-Income Countries, a negative and statistically significant linear correlation was observed between cesarean section rates and fetal mortality. No association was observed in medium- and high-income countries for either fetal mortality [30]. A worldwide population-based ecological study with longitudinal data found no important association between the caesarean section rate and maternal and fetal mortality which was observed when the caesarean section rate exceeded 10% [31]. One study suggested that differences in composite

mortality and morbidity rates applied to neonates born before but not after 37 weeks of gestation [32]. It is likely that higher vaginal mortality in our study related to birth asphyxia.

Based on our study findings, although singletons have 6 times higher risk to event, but this difference was at no statistically significant (p-value > 0.05). This result is inconsistent with other studies, as fetuses from multiple pregnancies have higher risk of mortality compared to singletons [23, 28, 33-35]. Women who have had the multiple births could prefer to choose cesarean section more than others [36]. In addition, one of the reasons for twin death could be the premature birth as well as limited embryonic growth in the mother's uterus [37]. Twins may account for about 10% of all prenatal mortality, which might be exclusively due to premature births [38]. Furthermore, various studies have shown that twins may have a lower Apgar score, the lower cardiac parameters and lower incidence of bleeding in the abdominal cavity; in addition, the rate of respiratory stress and necessity for intubation in the hospital may be much higher among them [39]. Multiple pregnancies could be associated with a higher risk of LBW. The other reasons of death among twin births might be the sudden death syndrome; in addition, they may have attention deficit, hyperactivity disorder and delays in physical growth with potential increase in intensive care [40]. The explanations of excess singletons mortality in our study are unclear.

Limitations

our study had some limitations that must be acknowledged, and kept in mind. First, it is a single hospital and retrospective study, therefore has an inherent selection bias, due to its observational nature. Second, the risk factors of preterm labor were not investigated as a total sample were preterm labor women. Last, the low in hospital events does not provide enough power to test for other unmeasured confounders.

Conclusion and recommendations

The prevalence of preterm labor was high at the maternity unit of Al Sabeen Maternity and Childhood Hospital Sana'a, Yemen compared with other developed countries. The most common etiologists of preterm labor were AAFV, PIH, abruptio placenta, placental previa and polyhydramnios. Compared with multiparous group, primiparous group showed significant lower age, and higher level of education. Older maternal age, vaginal deliveries and early preeclampsia were independent predictors of fetal mortality among preterm labor pregnancies. Women should be educated and counselled about preterm labor so that they can seek proper medical care to avoid adverse pregnancy outcomes in future and they should have access to good quality antenatal care. In order to improve maternal health, women should be educated and counselled about preterm labor so that they can seek proper medical care to avoid adverse pregnancy outcomes in future and they should have access to good quality antenatal care. Also timely recognition and management of preterm labor should be done. These results should be carefully taken into account by maternal care providers in order to inform women adequately, providing evidence-based knowledge to support their procreation choices, and to improve clinical surveillance aiming to identify early signs of adverse outcomes. Further, measures should be taken to reduce childhood malnutrition and to encourage education of the girl child. This will ultimately improve the level of utilization of health facilities by women during their reproductive age and thus would improve the obstetric outcome. An additional analysis for the outcome late preterm labor in the future also recommended. Finally, as Williams preached "the excellence of an obstetrician should be gauged not by the number of caesareans which he/she performs, but rather by those which he/she does not do".

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