



## **A Cross-sectional Comparative Study to Observe the Obstetric Complication Associated with Extreme (<18 - >35) Maternal Age**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aim:** To assess the frequency and association of obstetric complications in extreme of maternal ages.

**Methods:** A cross-sectional comparative study was conducted at a tertiary care hospital of district Nawabshah, Sindh and Suleman Roshan Medical College during the period April 2019- May 2020. The data regarding adverse obstetric outcomes of all teenage (<18 years) compared with the reference group of (19-22 years) and women of (>35 years) were compared with reference (31-34 years of age) delivering at the facility. The frequencies, percentages were derived as part of descriptive statistics, chi-square was used for parametric testing with 0.05 level of significance and odds ratio were applied to compare the risk of extreme age groups with their respective reference groups.

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**Results:** A total of 104 participants were recruited in this study among 16.3% accounted for teenage (<18 years) and 34.6% accounted for advanced maternal age (> 35 years). Multivariate association between maternal age groups and the adverse obstetric variables were taken into account. Elevated rates for all adverse obstetric outcomes were observed between the variables among extreme-age mothers compared to reference group. The differences were statistically significant with p-value of 0.001 respectively. The chi-square test was found to be insignificant for other factors such as socio demographics, obstetric history and mode of delivery. Odds ratio was calculated to measure the risk associated with extreme age. Those women who were <18 years of age attributed 3.2 odds of developing fetal complications and 3.9 odds of developing maternal complication whereas women >35 years of age attributed 3.7 odds of developing fetal and odds 10.7 developing maternal complications.

**Conclusion:** Women in extreme age group were at a higher risk for developing adverse fetal and maternal obstetric complications as compared to their reference group.

*Keywords: Extreme maternal age; obstetric complications; maternal and fetal complications.*

## 1. INTRODUCTION

Pregnancy is a state in which a woman undergoes rapid physiological changes throughout nine months of gestational period. She becomes physically and emotionally vulnerable and requires a lot of strength, support to combat the bodily changes and meet the demands of the developing fetus. Child birth at teenage (<18) [1] or at advanced age (>35 years of age) [2] is comprised of obstetric complications such as post-partum hemorrhage, obstructed labor, eclampsia or obstetric fistula, and fetal adverse outcomes such as fetal distress, cord prolapse, intrauterine growth retardation, and preterm [3]. Globally, 99% of maternal deaths are accounted in developing countries of which Sub-Saharan Africa and Southern Asia are the main contributors. If we narrow down to country level then India accounts for about nineteen percent whereas Pakistan, Sudan, Afghanistan and Bangladesh add three to five percent of total maternal deaths [4]. Maternal deaths due to complication of pregnancy are categorized as direct causes such as Postpartum Hemorrhage (PPH) 15 %, hypertensive disorders of pregnancy (10%) postpartum infection (8%) and obstructed labor (8%) [5]. Hemorrhage alone is one of the major reasons of maternal deaths, according to WHO, 10.5% of all live births are complicated by obstetrical hemorrhage. PPH was the most frequent cause reported among 14 million cases of obstetrical hemorrhage, resulting in 150,000 maternal deaths annually which forms a one quarter of total maternal mortality [6]. According to a study conducted in Peshawar stated that 24.5% of all maternal deaths in Pakistan are due to hemorrhage [7]. On the other hand, hypertensive disorders of pregnancy are also

major health burden in the obstetric population as it is one of the leading causes of maternal and perinatal morbidity and mortality. It ranges from preeclampsia/ eclampsia (PE/E), gestational hypertension, chronic hypertension (CH) and chronic hypertension superimposed preeclampsia. Each category has a different pathophysiology and fetomaternal consequences. The overall worldwide incidence is between 12-227 [8] but if we talk about one tertiary care then the prevalence of hypertensive disorder of pregnancy was found to be 69.1% over the period of one year [9]. Whereas the estimates of world health organization state the existence of obstetric fistula globally are between 50 000 to 100 000 women worldwide each year [10].

Pakistan is a country which is still striving to overcome the issue of maternal morbidity and mortality. It is failed in achieving the Millennium Development Goals but changes in recent trends have empowered women to peruse their career and education which have coerced women to delay childbearing especially in upper middle class. A review of Pakistan demographic health survey witnessed that frequency of advanced maternal age conception is increasing. This may lead to an increase number of infants born to mothers in the old high-risk category, which can have adverse long-term implications on the maternal and child health status of the country [11]. Due to all these prevailing issues in Pakistan the rate of intentional C-sections has also shown a sudden rise. A study was conducted in Rawalpindi to know the determinants of caesarean sections, and was found that there are multiple reasons for opting for surgical procedure by the surgeon and patients. The medical indications included

repeated caesarean, presumed fetal distress, failure to progress, breach births, hypertensive disorders, antepartum hemorrhage, near birth complications, postdate pregnancy, whereas the non-medical reasons were either the doctors schedule C-Section for economic gains, time management, minimizing risk factor, or for surgical practice or the demographic socio-economic profile of the patients such as older mother, highly educated woman, first teenage pregnancy and few of the women demanded for C- Section delivery because of fear of long labor and vaginal delivery pain [12].

A prospective case control study was conducted from September 2008 to November 2008 in three tertiary care hospitals in province of Sindh Pakistan. This study targeted the teenage group from (13-19 years of age) and was compared with non-teenage women (20-35 years of age) delivering in tertiary care hospitals of Karachi, Hyderabad and Nawabshah. The ratio of anemia meconium aspiration syndrome, post maturity, chorioamnionitis and instrumental delivery was high in teenage mothers as compared to non-teenage mothers [13]. So, this study was carried out to assess the frequency and association of obstetric complications in extreme of maternal ages.

## 2. METHODS

This cross-sectional study was conducted in the departments of Community Medicine, Pathology and Gynecology & Obstetrics, Peoples University of Medical and Health Sciences, Nawabshah, and Suleman Roshan Medical College Tando Adam, from April 20, 2019- 3<sup>rd</sup> May 2020. A pre-defined close ended questionnaire was run through participants after a written informed consent who qualified the inclusion criteria of the study. Women (<18->35 years of age) that suffered obstetric complication were taken as cases where as women (>18-<35 years of age) with or without an adverse outcome were taken as reference group. Cases between the ages of less than 18 years of age were matched and compared with women between 19-22 years of age and cases of greater than 35 years of age were compared with sub group are 31- 34 years old. The data was collected and analyzed using the SPSS V.20. Descriptive statistics were utilized to calculate proportions and percentages to characterize between two groups of age. For non-parametric testing chi-square was used to calculate the association of categorical variables and odds ratio was derived to compare the risk of

development of complications between different age limits.

## 3. RESULTS

A total of 104 women meeting inclusion criteria were included as study group during two weeks of data collection. The data was collected on the basis of socio-demographic, obstetric history and post delivery period. The distributions of average-aged and extreme-aged mothers by selected demographic and socioeconomic characteristics are presented in Table 1. The study population is comparable in terms of their socio-demographic characteristics. Most of the participants had similarity because the data was collected from only one tertiary care. There was no significant association of obstetric complication with the socio-demographic characteristics. Almost 78.8% of women had household income of 10,000-20,000 per month and 59.6% of them presented with obstetric complications. The association of household income with obstetric complication was found to be insignificant with a p-value of 0.226. The study participants were segregated into three categories to determine whether their living conditions have any influence on inimical effects throughout the pregnancy, and among 104 women 46.1% of them were living in kaccha house made of mud and clay but yet its association with obstetric complication was found to be negligible with p-value of 0.595. Level of education was classified into four groups such as uneducated, primary, secondary and higher secondary level. Maximum number of women were uneducated and only 26.1% and 1.9% of women had completed their primary and higher secondary level. The p-value of level of education with respect to obstetric complication was 0.233.

All the women seeking obstetric care at the facility is illustrated in Table 2. 16.3% were teenage (<18 years) mothers, 34.6% were advanced maternal age (> 35 years), whereas 49.1% women belonged to safe pregnancy age group. Therefore, the total percentage of women delivering in extreme age was about 50.9% of total deliveries.

Multivariate association between maternal age groups and the eight adverse obstetric outcome variables were considered in this study. Elevated rate for all adverse obstetric outcomes is observed between the variables among extreme-age mothers compared with reference group.

**Table 1. Socio-demographic association with Obstetric complications**

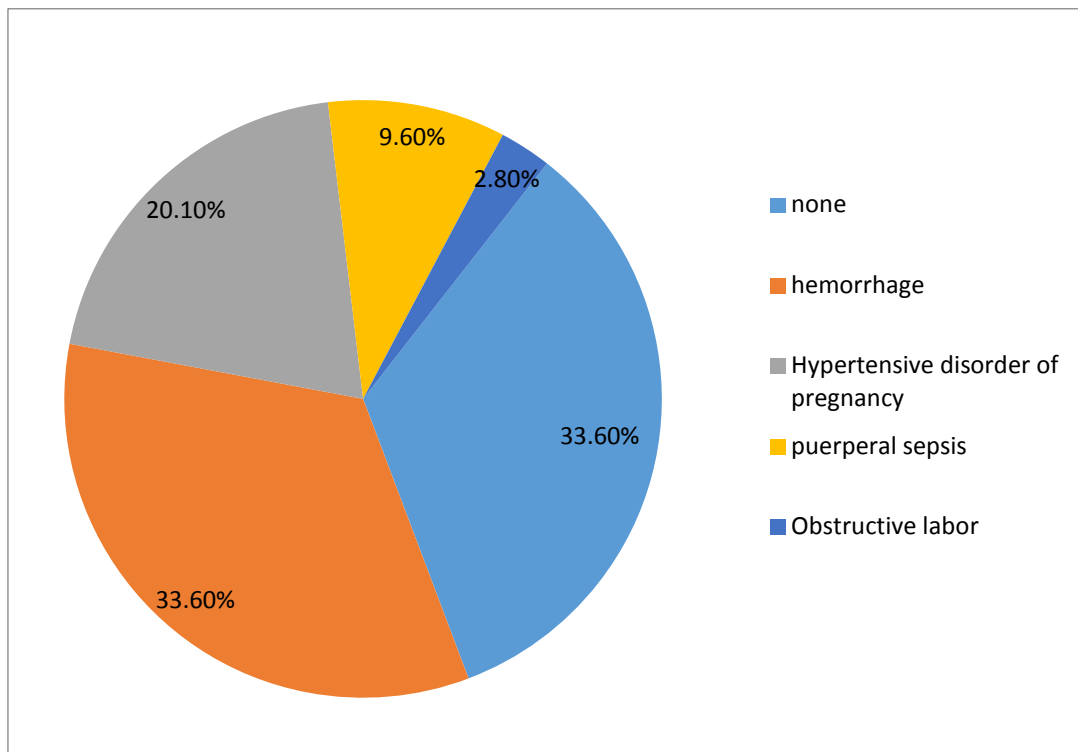
	Obstetric complications		Percentage of women developing obstetric complications	p-value
	Yes	No		
<b>Household Income</b>				
10,000-20,000	62	20	59.6%	0.226
20,000-30,000	9	4	8.6%	
30,000-40,000	3	4	2.8%	
40,000-50,000	2	0	1.9%	
<b>Total</b>	<b>76</b>	<b>28</b>		
<b>Type of Residence</b>				
Kaccha makan	48	15	46.1%	0.595
Semi pakka	15	8	14.4%	
Pakka makan	13	5	12.5%	
<b>Total</b>	<b>76</b>	<b>28</b>		
<b>Education level</b>				
Uneducated	49	13	47.1%	0.233
Primary	18	10	17.3%	
Secondary	7	5	6.7%	
Higher secondary	2	0	1.9%	
<b>Total</b>	<b>76</b>	<b>28</b>		

**Table 2. Frequency and percentage of obstetric complications in relation to maternal age**

Ages in years	Frequency of Women delivering at health care facility	Frequency of Women with obstetric complications	Obstetric Complication in percentage
<18	17	14	13.4 %
19-22	24	15	14.4 %
31-35	30	13	12.5 %
>35	36	34	32.6 %

**Table 3. Association of obstetric history with obstetric complications**

No: of Antenatal Visits	Obstetric complications		Percentage of women developing obstetric complications	p-value
	Yes	No		
None	24	9	23.07	0.670
1	9	5	8.65	
2	16	8	15.38	
3	17	4	16.34	
>3	10	2	9.61	
<b>Total</b>	<b>76</b>	<b>28</b>		
<b>Parity</b>				
None	12	0	11.5	0.244
1	13	8	12.5	
2	10	5	9.6	
3	11	5	10.5	
4	6	3	5.7	
>4	24	7	23.07	
	76	28		



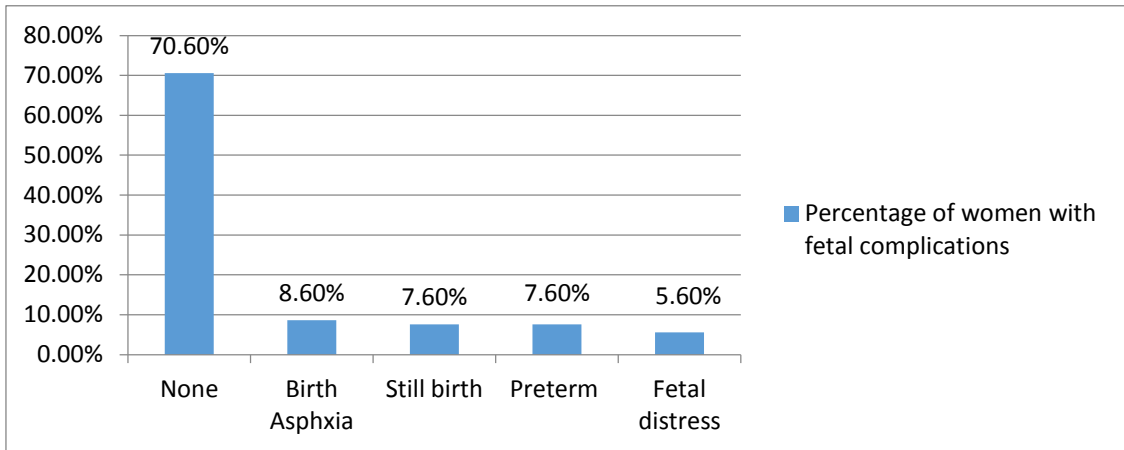
**Fig. 1. Distribution of women with maternal complications**

The differences were statistically significant with p-value of 0.001 respectively. Odds ratio was calculated to know how much risk is attributed by extreme age group with maternal or fetal complication. Those women who were <18 years of age attributed 3.2 odds of developing fetal complications and 3.9 odds of developing maternal complication than women who were 19-22 years of age, whereas women >35 years of age attributed 3.7 odds of developing fetal and 10.7 odds for developing maternal complications than women who were 31-35 years of age.

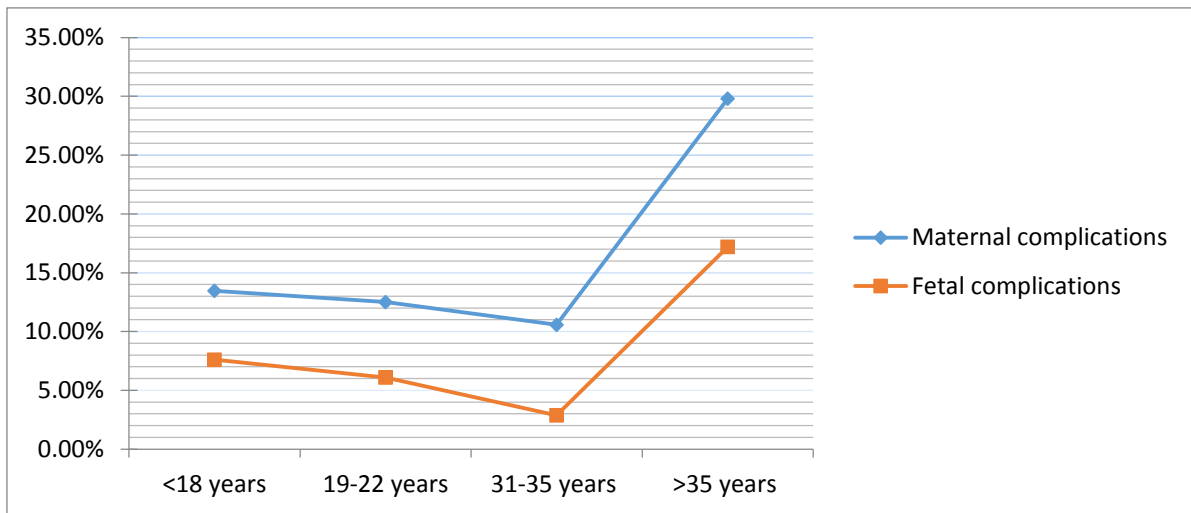
The overall highest percentage of complication observed was hemorrhage about 33.6%, whereas hypertensive disorder of pregnancy 20.1%, followed by puerperal sepsis 9.6% and obstructive labor 2.8%. On the other hand, when fetal complications were excluded and evaluated majority of the newborns suffered with asphyxia 8.6%, 7.6% with still birth and 7.6% were preterm whereas only 5.6% developed fetal distress Fig. 1.

Maternal age was found to be associating factor with maternal complication with p-value of 0.0001. Maternal age was found to associating factor with fetal complications with p-value of 0.013. Figs. 2 and 3. The obstetric history also

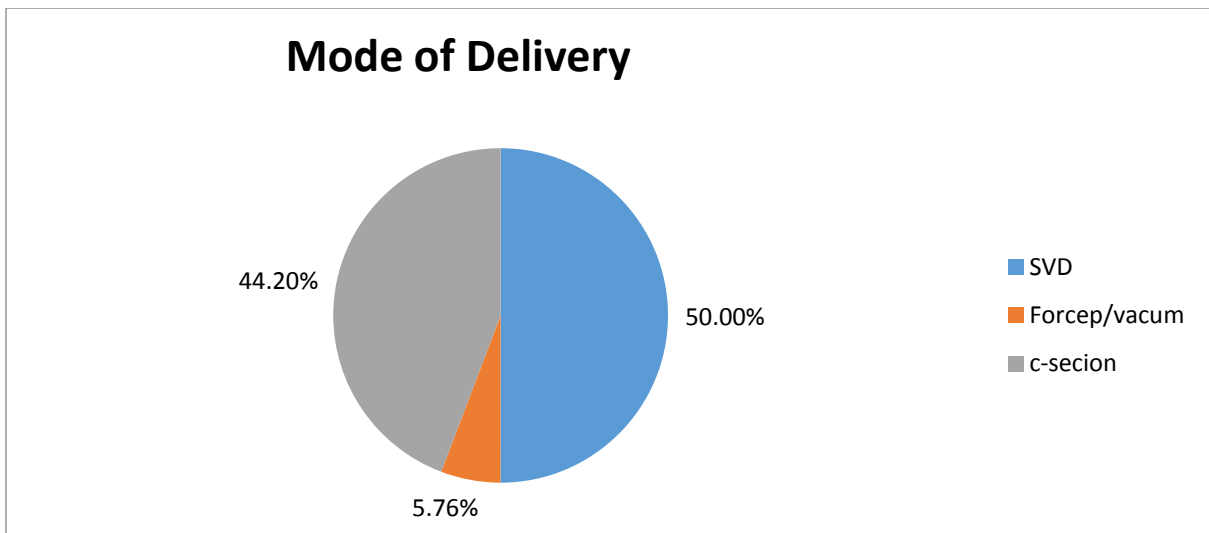
included number of antenatal visits and parity of the participants. Women who did not have any antenatal visits were more prone to develop complications and only 20% of all the women had recommended three antenatal visits and amongst them 16.34% still presented with obstetric complications. Overall antenatal visits did not predispose to complications as the test was found to be insignificant with p-value of 0.670. Those women who were multi gravid had highest frequency of establishing obstetric complication with 23.07% whereas women who had one, two, three and four children had 12.5%, 9.6%, 10.5% and 5.7% respectively. But women who were primi gravid had 11.5% of developing complications. Parity was found to be insignificant with p-value of 0.244 Table 3. The mode of delivery and its associated complications were recorded for all members of the study and the percentages are illustrated in Figs. 4 and 5. Almost 50% of the study population had spontaneous vaginal delivery from which 37.50% of women developed obstetric complications. 5.76% had forceps or vacuum extraction and 4.80% amongst them established with complications whereas 44.20% opted for caesarean section and 37.76% predispose to complications as shown in Figs. 4 and 5. The chi-square test was insignificant with p-value of 0.72.



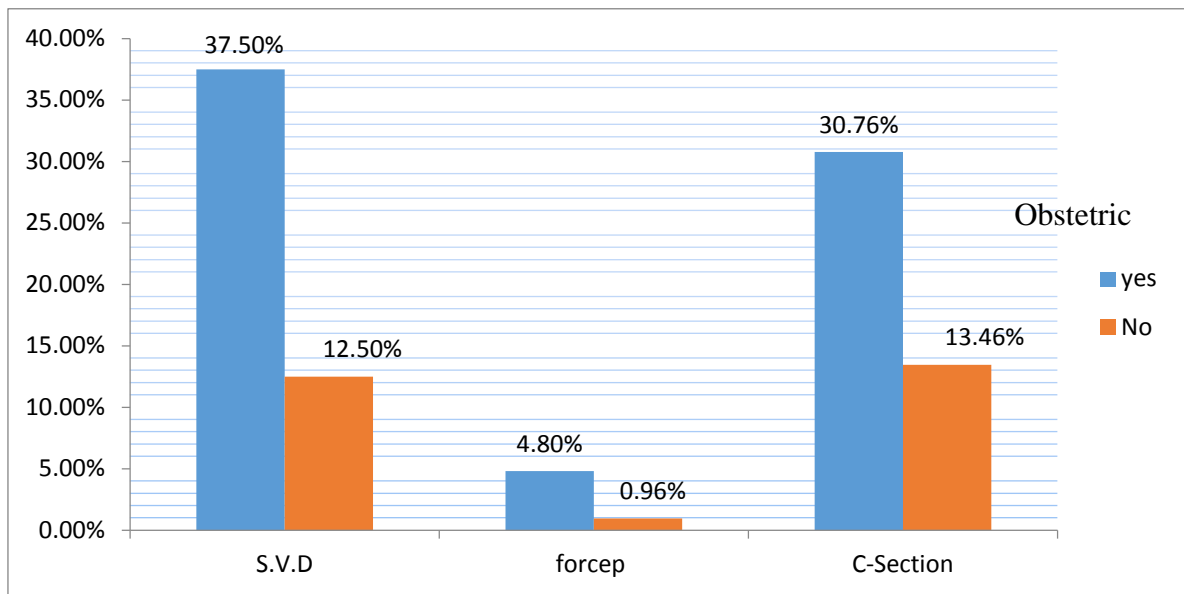
**Fig. 2. Percentage of women with fetal complications**



**Fig. 3. Percentage of women with maternal and fetal complications in relation to maternal age**



**Fig. 4. Mode of delivery and its frequency**



**Fig. 5. Percentage of obstetric complication in relation to mode of delivery**

#### 4. DISCUSSION

The main purpose of this cross-sectional comparative study was to investigate if extreme of ages is the associating factor for the development of adverse obstetric outcomes. This research primarily focused on the frequency of obstetric complications either maternal or fetal and to what extent the risk is attributed by the cutoff age limits.

The maternal characteristics regarding socio-demographics were found to be similar among the women visiting the health facility for obstetric care. Therefore, no clear association or significance could be ruled out. Most of the patients that seek care at this particular health facility belong to poor socio-economic class living in kaccha house with 10,000-20,000 of monthly income. The education level was also at minimum within the participants but yet it wasn't proven to be the predisposing factor for adverse obstetric outcomes. However, there could have been more variation in the study participants if the data would have been collected throughout the year but due to limited time and resources, we were only able to collect the data within the given time frame.

The frequency of pregnant women in extreme age group was found to be 50.9% from which 16.4% was contributed by teenage (<18 years of age) and rest was attributed by advanced maternal age (>35 years of age). The existing and latest reference is only available form report

of PDHS 2007 which stated 7% for teenage pregnancy and 22.4% for advanced maternal age in a study conducted at Oman [14,15]. If we look at age specific fertility rates of Pakistani women associated with high-risk groups are 55 and 117 respectively. These specific rates are contributed by the entire country but if we narrow down and consider the share of one tertiary care then the above-mentioned figures would present with remarkable increase. This escalation in pregnancy rate would lead to rise in prevalence of obstetric complications as proven by results in this study.

The literature provided us with an aid to identify and narrow down most prevailing and commonly occurring obstetric complications throughout the world. The maternal age was also classified into four groups keeping < 18 years of age as the lower limit and > 35 years of age as upper limit of the extreme group. These cutoff points were identified by USAID who initiated and a family planning intervention all over Pakistan by name of Healthy timing and spacing pregnancy and one of its objectives was to delay pregnancy before 18 years of age and to avoid pregnancy after one has passed over the age of 35 years [1] so to know that whether the extreme group has potential risk of developing the adverse obstetric outcomes. The odds for developing maternal complications were higher for both extreme ages (<18: 3.9 odds, >35: 10.7 odds) as compared with their reference groups. These results were found to be in concurrence with two other studies conducted in Karachi [11] and in Nawabshah

[13]. Extreme of age is not only contributing factor for maternal but also for fetal complication as justified in a study conducted at Thailand that stated the rate of still birth as 43/1000 live births and preterm, fetal distress were significantly associated with some AMA groups when compared with women aged 20–34 years [12], so as with this study there is an association between fetal complications and extreme age group with p-value of 0.013 and odds of 3.7 and 3.2 for both vulnerable age groups.

The percentages of maternal and fetal complications were individually calculated to explore the majority cause of obstetric adverse outcomes. The highest frequency of occurrence among the maternal complication was hemorrhage (33.60%) which has always been a primary concern for clinicians and public health providers. WHO gave prevalence of 34% of hemorrhage in Pakistan [6]? There are several studies which show similar figures to our study like a study conducted at tertiary level hospital in Pakistan found hemorrhage to be commonest cause of maternal deaths [7]. Other complications such as hypertensive disorder of pregnancy was found to be second cause of maternal complications with 20.1% occurrence whereas this percentage was quite higher than it was stated in a study conducted at a tertiary care hospital Lahore [9]. The other two complications such as puerperal sepsis and obstructed labor was found to be of minimum percentage because the rate of C-sections have increased with the passage of time [18] as the obstetricians find it more convenient and it prevents complication such as fetal distress and obstructed labor.

Obstetric complications are not only limited to mother but they have significant impact on the developing embryo and maternal age has always been prime point of controversy amongst gynecologist and obstetrician. There is a need of detailed research to find out the effect of maternal age on fetal outcomes right from the time of conception but this study only focuses on fetal adverse outcomes that were encountered at the time of delivery. Surprisingly the percentages of fetal adverse outcomes were far less than the maternal outcomes in extreme and safe pregnancy age groups. The frequency of fetal complications was found to be 29.40% among all participants with highest percentage achieved by birth asphyxia (8.60%), 7.60% by still birth and fetal distress and 5.60% by preterm. If we compare these results with other researches like one conducted in Taiwan suggested that Infants

born to teenagers and women at advanced age possess greater risks for stillbirth, preterm birth, neonatal death, congenital anomaly, and low birth weight (p-value 0.0001) [19]. It is well acknowledged that teenage pregnancies are at increased risk for adverse birth outcomes [20]. Consistent with other studies our results show a steep rise in adverse birth outcomes among advanced aged pregnancies. It is important to note that the risks of stillbirth, fetal distress, preterm and birth asphyxia are significantly higher in women with more than 35 years of age as compared with their reference group. To our knowledge, this is the first report showing that pregnant AMA was at the greatest risk for adverse outcomes among all age groups. The data suggest that medical professionals need to take into consideration the increased likelihood of adverse birth outcomes with advanced aged pregnancies. Nevertheless, the complications of teenage delivery were less than that of delivery at advanced age, which is consistent with the fact that the number of pregnancies at teenage is less than that at advanced age. Thus, the population burden of adverse maternal and fetal complications is more heavily influenced by women at advanced age than by younger pregnancies.

One of the important aspects to determine healthy outcomes is to address the importance of obstetric history. A comprehensive detailed history includes many questions that cover all important information that can help in identifying future risks of the pregnancy. In this study we only included two parameters of obstetric history. One question was related to antenatal visits and other was regarding parity to know whether these two demonstrate association with obstetric complications. The test was found to be insignificant for both factors. There were only 20% women among the study population who had three recommended antenatal visits but yet 16.5% presented with obstetric complications. Similarly, a population-based study was conducted in Finland that stated that teenagers made a good mean number of antenatal clinic visits (16.4 vs. 16.5) as compared to advanced aged group but were more likely to have attended fewer than half of the recommended visits (3% (n=210) vs 1.4% (n=716) and adequate antenatal care among teenagers have shown decrease adverse neonatal outcomes [16]. As far as parity is considered women who were multi gravid with more than four children were prone to develop complications. But women who had four children were less likely to develop



complications therefore the test was found to be insignificant as no clear association of parity with obstetric complications was ruled out. However, women who were primi gravid had shown 11.6% of developing complications.

Mode of delivery is the one of the fundamental facets of pregnancy outcomes so it was evaluated to know whether it has significance in producing complications. Three major modalities: SVD, forceps, vacuum and C-sections were taken into account. 50% of deliveries were performed by SVD and they accounted for maximum percentage of complications. Whereas the percentage of C-sections was 42.20% and they presented with 30.76% of obstetric complications. Overall, the percentage of C-section in Pakistan is about 37.20% [12]. The rate of cesarean delivery in Turkey was found to be 31.6% in all the deliveries. The most common cause of cesarean section indication was fetal distress in extreme age group. An increase was observed in the cesarean delivery rate, which is consistent with the literature about AMA [2] and teenage pregnancy [13]. The majority of C-sections are a choice of women from urban, educated and wealthy background or women of these characteristics are targeted by physicians and facilities but further research can investigate why this population segment is having more C section deliveries in Pakistan. Despite with the increase in surgical procedure there was still increase in percentage of obstetric complications among the study participants therefore the tests were found to statically insignificant for association.

The main limitations of our study were, firstly, the sample size for women in extreme age group was small due to strict timelines. Secondly period sampling was utilized as there was not a single reference which could have given the average percentage of the complications observed in this study therefore it was very difficult to derive out the standard sample size. Due to the choice of sampling this study cannot be generalized on country level. Our data lack information on some of the relevant confounding factors in the evaluation of the odds ratio, namely, the mother's health, nutrition, her reproductive history and preexisting chronic conditions prior to the recorded delivery, and management of the pregnancy. To determine the independent effects of maternal age on adverse obstetric outcomes a qualitative analysis could have brought about the reasons for too early or delaying of child birth in different age groups.

## 5. CONCLUSION

We found increased risks of some adverse obstetric outcomes among women <18 years and > 35 years of age. Our data indicate higher risk of hemorrhage, hypertensive disorder of pregnancy and puerperal sepsis with in maternal complications whereas birth asphyxia, fetal distress and still birth with in fetal complications and overall higher risk of complications associated with spontaneous vaginal delivery among all aged women visiting tertiary care at Nawabshah. These findings have implications for maternity service providers, particularly as trends of teenage pregnancy and advanced maternal age continue in the district. Therefore, there is a need to offer pre-marital counseling for younger women and post-marital counseling to older women so that they become informed about the increased risks involved with pregnancy in extreme of age. There is a need for more extensive research in the district to find out the major reasons for child bearing in this age group and to know the contraception prevalence rate at the facility. A qualitative study would be helpful to find out the reasons for institutional C-sections.

## ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

## CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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