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Impact of Maternal Age on The Rate of Caesarean Section in Induced and Spontaneous Labour

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ABSTRACT

Background: Maternal age at childbirth is increasing due to expanded educational and career opportunities for women. The objective of this study was to determine the impact of maternal age on the caesarean section rate in induced and spontaneous labour.

Methods: A Parallel Arm Quasi-Experimental study was conducted at the Gynaecology and Obstetrics Department of Zia Uddin University Hospital from July to December 2022, with a sample of 284 pregnant females, aged 17-41 years, with 37-42 completed gestational weeks. Non-probability consecutive sampling technique was used. The spontaneous group was comprised of patients with a natural onset of labour, while those who were induced were included in the induced group. The mode of delivery in both groups was assessed, and the association of caesarean section rate with the mode of onset of delivery was analysed by chi-square test. Data was entered and analysed in SPSS version 21. Effect modification was assessed through stratification of age. Binary logistic regression was applied to caesarean section to address the effect modifiers. P-value ≤ 0.05 was considered statistically significant.

Results: The mean maternal age of women were 28.47 ± 4.868 years. No statistical significance of maternal age was seen with caesarean section in induced and spontaneous labour (p-value = 0.696 and 0.055, respectively).

Conclusion: Maternal age is not associated with an increased rate of caesarean section in induced as well as spontaneous labour.

Keywords: Maternal Age, Induction of Labour, Caesarean Section.

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INTRODUCTION

Maternal age at childbirth has increased all over the world, including Asian countries. Today's Women are more ambitious and dedicated to getting higher education and career development. The mean age of women for childbirth has also increased throughout the world, including in Europe and the USA, for many decades[1]. The reason behind the increasing maternal age for pregnancy could be assisted reproductive techniques, empowerment of women, increasing responsibilities at work, prioritising their career and late conception[2]. According to recent advances in 2019, rates of induction of labour are also increasing throughout the world[3]. In developed countries, 1:4 women are induced, 24.5% in the USA and 33% in Europe. While it is higher among Asian countries. Its incidence is 35.5% in Sri Lanka, 19.9% in Japan and 2.5% in Cambodia. According to WHO guidelines, inductions should only be carried out whenever there is a valid medical indication like postdate pregnancy, gestational hypertension, diabetes mellitus and premature rupture of membranes[4].

Induction of labour has only to be considered when the benefits of prompt vaginal birth outweigh the maternal and foetal risks to wait for spontaneous onset of labour. In Saudi Arabia, a study was conducted to see the impact of maternal age, parity and BMI on increasing the rate of caesarean section[5]. It showed no significant relationship between the caesarean section rate and maternal age or parity, while a statistically significant association was seen between obesity and the caesarean rate. Advanced maternal age (40-44 years) and very advanced maternal age (45 years and older) both had a higher chance of unplanned caesarean section compared to the general population. Induction of labour lowers the risk of unplanned caesarean section in nulliparous women[6]. In a comparative study on Nulliparous women, the incidence of caesarean section was higher, 54% in induced as compared to spontaneous labour, 17.1%[7]. According to the results of a study conducted in Switzerland, advanced maternal age is associated with an increased risk of unscheduled caesarean delivery among nulliparous[8]. There was a higher chance of intrapartum caesarean section in women aged 40 years and above. The independent risk factors were nulliparity, regional anaesthesia, induction of labour, multiple gestation and previous caesarean section[9].An increased rate of caesarean deliveries was seen amongst maternal age 40 years and older after induction at term without any maternal or foetal risk factor[10].

A study on pregnancy in the fifth decade of life has shown the importance of antenatal care and neonatal management [11]. The pregnancies in very advanced maternal age are susceptible to a higher risk of complications, such as diabetes, hypertension and an increase in maternal and foetal mortality[12], [13]. About the rationale of the study, it is stated that induction of labour has an important place in the obstetrical practice and the impact of maternal age on the induction of labour needs to be discussed. More research work is required in this area as there are still contradictory reports and differences in experiences at different centres. We need to address it in our perspective to generate our experimental data regarding a very important issue in debate about the obstetrical practice. The objective of this study was to find out the effect of maternal age on caesarean section rate in women undergoing induced labour versus spontaneous labour.

METHODS

After the approval of the Ethical Review Committee with reference code 5090322SUGYN, the study was conducted in all four campuses of Dr. Zia Uddin Hospital Karachi from July 2022 to December 2022. It was a Parallel Arm Quasi-Experimental study design. Booked pregnant women between 37 to 42 completed weeks of gestation with no contra-indication to vaginal birth and have given consent to be a part of this study were included. Non-probability consecutive sampling technique was used to enrol the patients in the study. The minimum age of the participants was 17 years and the maximum age was 41 years. Non-probability sample size was calculated by using the Open epi sample size calculator. The confidence interval was taken as 95% and the power of study as 80%. The calculated sample size was 228. But a sample of 284 was taken, which was divided into two equal groups of 142 each i.e., the induced and spontaneous group. The data was collected after approval of the ERC committee.

The women with twin pregnancies, previous scar, non-cephalic presentations, placenta praevia, pregnancy with anomalous baby and those who opted for an early caesarean section were excluded. Demographic data including age, weight, height, and parity was taken. Women who went into labour without any intervention were included in the spontaneous group and women who were induced with prostaglandins or Foley's catheter to initiate labour were included in the induced group. Mode of delivery i.e., caesarean section / vaginal delivery was assessed for both groups. Data was entered and analysed in SPSS version 24. The normality of maternal age, gestational age and parity was assessed by using the Shapiro-Wilk test. Maternal age was found to be normally distributed and represented as mean ± SD. Frequencies along with percentages were used for categorical variables as BMI groups, Outcome

variables as caesarean section, were compared between two groups, i.e., induced and spontaneous labour, by using the Chi-square test. Effect modifiers i.e., maternal age, gestational age, parity and BMI, were addressed by using binary logistic regression with univariate and multivariate analysis. For univariate analysis, the p-value < 0.25 was considered statistically significant. For the multivariate analysis model, all the significant factors, irrespective of significance level, were considered. The P-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Descriptive Statistics for Induced Labour and Spontaneous Labour Groups (n = 284)

Variables	Induced Labour group (n=142)		Spontaneous Labour group (n=142)	
	P-value (Shapiro-Wilk)	Mean ± SD / Med [IQR]	P-value (Shapiro-Wilk)	Mean ± SD / Med [IQR]
Maternal age (Years)	0.155*	29.03 ± 4.719	0.065*	27.91 ± 4.966

**Significant P-value*

The normality of maternal age was assessed. Maternal age was found normally distributed in both the groups, induced labour and spontaneous labour, with mean maternal age as 29.03 ± 4.719 years and 27.91 ± 4.966 years respectively (**Table-1**).

Table 2: Comparison of Mode of Onset of Labour and Caesarean Section

Mode of Onset of Labour	Mode of delivery		Total	P-value
	Caesarean section	Spontaneous vaginal delivery		
Induced	32 (22.5%)	110 (77.5%)	142 (100%)	0.066
Spontaneous	20 (14.1%)	122 (85.9%)	142 (100%)	
Total	52 (18.3%)	232 (81.7%)	284 (100%)	

**Chi-square test applied*!

Table 2 depicts the association of caesarean section with the mode of onset of labour. There was no statistically significant difference found in the caesarean section rate between the induced and spontaneous labour (p-value = 0.066). In both the groups, the rate of caesarean section was low, however, in spontaneous labour, the frequency of caesarean section was lower, 20 (14.1%) as compared to induced labour, 32 (22.5%).

Table 3: Binary Logistic Regression on Caesarean Section w.r.t. Multiple Factors

For Induced Labour				
Independent variables	Univariate Analysis		Multivariate Analysis	
	Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Maternal age (Years)	0.980 (0.901 – 1.066)	0.642	0.980 (0.884 – 1.085)	0.696
For Spontaneous Labour				
Independent variables	Univariate Analysis		Multivariate Analysis	
	Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Maternal age (Years)	0.995 (0.904 – 1.095)	0.916	1.136 (0.997 – 1.294)	0.055

** Significant at P-value < 0.25 for Univariate analysis.*

*** Significant at P-value < 0.05 for Multivariate analysis.*

The first part of **Table 3** shows the analysis *of Induced labour*. The Univariate analysis indicates that for every 1-year increase in maternal age, the odds of a caesarean section are expected to be 2% lower, for every 1-week increase in gestational age, the odds of a caesarean section are expected to be 21.5% higher, Since P-value > 0.25 for maternal age, statistically, there is an insignificant association of maternal age with caesarean section.

The second part of **Table 3** depicts the analysis of Spontaneous labour. The Univariate analysis indicates that for every 1-year increase in maternal age, the odds of caesarean section are expected to be 0.5% lower. Since P-value > 0.25 for maternal age, so statistically there is an insignificant association of maternal age with caesarean section.

The Multivariate analysis results showed a statistically insignificant association of maternal age with caesarean section (p-value > 0.05).

DISCUSSION

The important finding in this study was the impact of maternal age on the mode of delivery in both induced and spontaneous labour. There was no statistically significant association between maternal age and caesarean section rate in induced and spontaneous labour.

In another study, the rate of caesarean section was increased in nulliparous women with advanced maternal age[14].In very advanced maternal age 45 to 49 years, there was an increased risk of postpartum haemorrhage, gestational diabetes mellitus, pregnancy-induced hypertension, NICU admissions and length of stay in NICU[15]. The influence of maternal age on caesarean section rate among induced women at term was studied[16]. Rate of caesarean section was similar in both age groups, i.e., = >35 years and <35 years, after settling confounders, maternal age did not influence rate of caesarean section.

The effects of maternal age were studied on mode of delivery in induced Nulliparous women at term, and it was seen that maternal age was associated with a higher rate of LSCS in Nulliparous women after induction at term labour.[17]An increased risk of physical, and mental and behavioural disorders was seen in older single women which had an increased 5-year morbidity as compared to younger women[18]. Although women in that study were mostly single mothers, less frequently tobacco users and with a higher BMI. A study on maternal age and risk of caesarean section in induced labour has found that maternal age is associated with an increased rate of caesarean section at term in singleton pregnancies[19]. The risk of hysterectomy and the need for blood transfusion may also be increased with advancing age[20]. Another study has shown that there was not an increased risk of emergency caesarean section in advanced maternal age when induction of labour at 39 weeks was given [21]. A cohort study was conducted to see the outcome in induction at 39 weeks based on age and found that the outcome varies with age[22].

Clinical counselling regarding maternal age and parity, antenatal care and proper medical interventions can improve pregnancy outcomes in mothers of advanced age[23]. If maternal age is 40 years or more, then delivery at 39 weeks is recommended [24]. It will decrease the potential risk of caesarean section and pregnancy-induced hypertension. A study was conducted to assess whether induction of labour in advanced maternal age increases caesarean delivery as compared to spontaneous delivery[25]. In their study six randomized clinical trials, a few observational and retrospective cohort studies were included. They concluded that maternal age does not affect the rate of caesarean delivery in induced women. These results were a reassurance for obstetricians who are concerned about the impact of advanced maternal age on increased caesarean delivery. In a retrospective cohort study the relationship between maternal age, duration of labour induction and maternal and neonatal outcome was seen[26]. No association between maternal age and caesarean section rate was found.

Maternal age has become an important factor in obstetrical practice, but still, more studies are required to see the impact of maternal age on the mode of delivery and its associated complications. More research work is still required as there are still contradictory reports and differences in experiences at different centres.

CONCLUSION

In obstetrics, advanced maternal age has always been a matter of concern and it should be considered carefully. However, in our study which was conducted to find out the effect of maternal age on the rate of caesarean section in spontaneous and induced labour. It was found out that maternal age does not affect the rate of caesarean section in both induced and spontaneous labour.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

ETHICAL APPROVAL
The study received ethical approval from the reference code 5090322SUGYN Ziauddin University.

PATIENT CONSENT
Informed written consent of participating women was taken.

AUTHORS' CONTRIBUTIONS
SU collected data and has written the article. **KS, RY, and ES** collected data and analysed the data.

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