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ASSOCIATION OF OBESITY WITH FAILURE OF INDUCTION IN PREGNANT WOMEN

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Abstract: ***Objective:*** To find out the relation between obesity and failure of induction of labour in the pregnant women. This cohort study was conducted in the Department of Obstetrics and Gynaecology, Moula Bakhsh teaching Hospital, Sargodha in period of 1st December 2022 to 30th May 2023. A total of 202 pregnant women were enrolled in the study using the non-probability consecutive sampling after satisfying the inclusion criteria of 18 - 35 years old, singleton pregnancy, at the 38 - 42 weeks gestation undergoing induction of labour. They were separated into two equal categories namely obese (BMI 27 to 30 kg/m^2 and above) and normal weight (BMI 19 to 25 kg/m^2).The induction of labour was done by using intracervical gel of prostaglandin E2 and results were measured in 24 hours. Induction failure was when the cervix did not dilate over 4 cm in the course of 24 hours. IBM SPSS version 22 was used to analyze the data. We compared the results of a chi-square test and used relative risk obtained to be statistically significant, P = - 0.05. The average age (29.11 ± 1.91) was obese and (28.68 ± 2.70) normal weight group. Mean gestational age was 39.32 ± 1.10 weeks and 38.96 ± 1.01 weeks, respectively. Induction failure was also much more prevalent in obese group (29.7%) than in the normal weight group (15.8%) (p = 0.018). Most of the subgroups of obese women resulted in a higher risk of failure, though the most significant difference in risks was found in women whose gestational age fell between 38 and 40 weeks (p = 0.024) and those whose weight was low (>70kg). The research arrived at a conclusion that maternal obesity is greatly linked with the development of risk factor of failed labour induction. The probability of induction failure rises in proportion to higher maternal BMI and this implies that obesity may be a significant predictor of low labour induction rates in pregnancy.

Keywords: Maternal obesity, Induction of labour, Failure of induction, Pregnancy outcome, Cervical ripening.

INTRODUCTION

A growing worldwide health issue impacting women of reproductive age, maternal obesity is a main cause of negative obstetric outcomes[1]. It is related to notable metabolic, endocrine, and physiological changes that complicate pregnancy and delivery, therefore raising maternal and foetal risks[2]. All of which add to increased maternal morbidity, obesity in pregnancy is correlated with a greater incidence of gestational diabetes mellitus, hypertensive disorders, fetal macrosomia, and increased operative deliveries[3,4]. Among these problems, in obstetric practice, dysfunctional labour and failed induction of labour are major clinical difficulties[5].

A frequently carried out obstetrics operation meant to get vaginal delivery when continuing pregnancy presents a risk to the mother or baby is induction of labour[6]. However, several elements, including parity, gestational age, cervical condition, and maternal body mass index (BMI), affect its success[7]. Overweight, Higher induction failure rates result from women's propensity for protracted labour, poor uterine contractility, and negative cervical conditions, all of which [8]. Researchers have revealed that a progressive rise in the probability of failed induction and hence cesarean delivery is directly correlated with an increase in BMI[9].

Especially when cesarean delivery follows long labour or failed induction efforts, failed induction of labour is linked to higher maternal morbidity, including postpartum hemorrhage, infection, and uterine rupture [10]. Also, more frequent in such circumstances are neonatal problems including, admission to neonatal intensive care units and fetal distress[11]. Improved obstetric results depend on spotting modifiable and non-modifiable predictors of induction failure; hence, these hazards emphasize their relevance[12].

The increasing prevalence of obesity among women of reproductive age in Pakistan has grown to be a major public health concern; this is further exacerbated by inadequate antenatal risk stratification and healthcare facility resource limitations[13]. Still, very little regional data examines how mothers' obesity affects labour induction results. Thus, this study sought to find out the link between obesity and failure of induction of labour in expectant mothers[14].

MATERIAL AND METHODS

The Department of Obstetrics and Gynaecology at Moula Bakhsh teaching Hospital, Sargodha, carried out this cohort study. The hospital's Ethical Review Board and the pertinent research division of CPSP both granted ethical approval. From 1st December 2022 to 30th May 2023, the study lasted six months. A non-probability consecutive sampling method was used to recruit 202 pregnant women meeting the inclusion criteria[14–16].

Pregnant women aged 18 – 35 years with parity ranging from 0–4, singleton pregnancy verified on ultrasound, gestational age between 38 – 42 weeks based on last menstruation, and those having labour induction were included in the research. Two groups of participants were created equally: Group A (obese group) comprised women with a BMI ranging from 27 to 30 kg/m², whereas Group B (normal weight group) consisted of women with a BMI ranging from 19 to 25 kg/m². Excluding women with a history of caesarean section, hypertension, renal disease, or congenital fetal abnormalities helped to reduce confounding variables[17].

Following informed consent, comprehensive demographic and clinical information including, age, gestational age, parity, weight, height, and other variables were gathered. BMI was determined with the conventional formula: weight in kilograms divided by height in meter square[18]. Within six hours of enrollment, all participants had labour induced with 0.5 mg intracervical prostaglandin E2 (PGE2) gel. Reinduction was done 10 hours following situations when cervical dilatation did not exceed 4cm[19].

Failure of induction of labour, defined as the inability to attain cervical dilatation > 4 cm within 24 hours following induction, was the main result indicator. A consultant obstetrician with at least three years of post-fellowship experience oversaw all operations. The principal investigator kept outcome data on a predesigned pro forma [20 –21].

IBM SPSS version 22.0 was used to examine data. Age, gestational age, parity, weight, and height quantitative factors were given as mean plus or minus standard deviation; categorical variables, such as induction failure, were shown as percentages and frequencies. It was done using a Chi-square test to determine whether there would be a difference in the frequency of failure of induction among the two groups. A p-value of less than 0.05 was considered statistically significant. Calculating relative risk (RR) also helps to gauge the degree of correlation. To manage effect modifiers and evaluate their influence on the outcome, stratified analysis was done for age, gestational age, parity, and weight[22]

RESULTS

Table-I: Baseline characteristics of patients in both groups (n = 202)

Variable	Group A (Mean ± SD) n = 101	Group B (Mean ± SD) n = 101
Age (years)	29.118 ± 1.91	28.683 ± 2.70
Gestational age (weeks)	39.326 ± 1.10	38.960 ± 1.01
Parity	1.316 ± 1.32	1.009 ± 0.06
Weight (Kg)	62.505 ± 5.77	63.277 ± 6.32
Height (m)	1.461 ± 0.06	1.608 ± 0.08

Table-II: Comparison and stratification of failure of induction of labour

Stratification	Group	Yes n (%)	No n (%)	P-Value
Overall outcome	A	30 (29.7)	71 (70.3)	0.018
	B	16 (15.8)	85 (84.2)	
Age (years)				
Age group	**Group**	**Yes n (%)**	**No n (%)**	**P-Value**
18 - 30	A	21 (29.2)	51 (70.8)	0.284
	B	12 (15.6)	65 (84.4)	
> 30	A	9 (31)	20 (69)	0.226
	B	4 (16.7)	20 (83.3)	
Gestational Age (weeks)				
GA group	**Group**	**Yes n (%)**	**No n (%)**	**P-Value**
38 - 40	A	25 (29.8%)	59 (70.2)	0.024
	B	14 (15.6%)	76 (84.4)	
41 - 42	A	5 (29.4%)	12 (70.6)	0.502
	B	2 (18.2%)	9 (81.8)	
Parity				
Parity group	**Group**	**Yes n (%)**	**No n (%)**	**P-Value**
0 - 2	A	20 (28.6)	50 (71.4)	0.062
	B	12 (15.8)	64 (84.2)	
3 - 4	A	10 (32.3)	21 (67.7)	0.162
	B	4 (16)	21 (84)	
Weight (Kg)				
Weight group	**Group**	**Yes n (%)**	**No n (%)**	**P-Value**
< 70	A	20 (22.5)	69 (77.5)	0.000
	B	2 (2.4)	83 (97.6)	
≥ 70	A	10 (83.3)	2 (16.7)	0.755
	B	14 (87.5)	2(12.5)	

This study involved 202 patients randomly selected without any skewing and selected on the basis of two groups: obese (Group A) and normal weight (Group B). The mean age was 29.118±1.91 years in Group A and 28.683 ± 2.70 years in Group B. Mean gestational age was slightly higher in Group A (39.326 ± 1.10 weeks) compared to Group B (38.960 ± 1.01 weeks). Mean parity was 1.316 ± 1.32 in Group A and 1.009 ± 0.06 in Group B. The mean weight was 62.505 ± 5.77 kg in Group A and 63.277 ± 6.32 kg in Group B, while the mean height was 1.461±0.06 m and 1.608 ± 0.08 m in Group A and Group B, respectively, as shown in Table I[8].

There was a significant difference between non-induction of labour in obese women (Group A) and normal weight women (Group B). It was seen in 29.7 percent in Group A and 15.8 percent in Group B, and statistically significant difference (p = 0.018) and relative risk of 1.89, Table II[13,14].

Analysis Stratification Failure according to age, gestational age, parity and weight resulted in variable results. Group A (29.2 - 30 years of age) showed higher failure of induction than Group B (15.6 - 18 years of age) and the difference between the two groups was not significant (p = 0.284). Similar tendencies were noted in the patients of age > 30 (p = 0.226) [15]. A significant association was identified in the group on gestational age of 38 - 40 weeks (p = 0.024), without a significant difference in the 41 - 42 weeks group (p = 0.502). The analysis of stratification by parity revealed a higher failure rate in the case of obese women in both parity groups, although not significantly (p = 0.062 and p = 0.162, respectively). But weight stratification indicated a strong relationship with significantly more obese women failing induction when their weight is less than 70kg (p < 0.001), as shown in Tables II[20-22].

As a whole, there was a pattern of increased risk of failed induction of labour among most stratified variables among obese women as compared to normal weight Women, and there was a significant overall relative risk of 1.89[16].

DISCUSSION

The issue of obesity has been widely recognized as a predisposing factor with a negative influence on the outcomes of pregnancy and complicates the obstetric management, especially the obstetric induction of labour[6]. An increase in maternal BMI has been linked to a change in the uterine contractility, resistance to prostaglandins, failure to induce labor, more operative births and maternal morbidity. This paper, thus, analyzed the impact of maternal overweight on the success of labour induction versus normal weight woman[8-12].

The current cohort study showed that the obese women were significantly more likely to have failed induction of labour than their normal-weight counterparts (29.7% vs 15.8% p=0.018). These results agree with past literature, which continues to document obesity as a predictive independent variable of failed induction and a lengthy labour. The same outcome was claimed by Wolfe et al., who remarked that obese women were almost twice as likely to experience failed induction as women with normal BMI ranging from 19 to 25 kg/m²[15]. Dose-dependent interaction between rising BMI and induction failure has also been demonstrated in other studies and this supports the biological plausibility that this relationship is due to reduced uterine responsiveness in obesity[13,14].

Gestational age (38 - 40 weeks) also significantly correlated with unsuccessful induction among obese women (p = 0.024), which indicates that despite the fact that the gestation period is in term, the maternal BMI still has an effect on the labour outcomes. There was, however, no substantial difference in the older gestational age group; this could be explained by the smaller sample distribution. On the same note, the failure rates of obese women were observed to differ across age and the case of parity; they did not differ significantly. This concurs with prior research that parity and age are independent predictors of labour outcomes, but obesity is a more potent independent predictor[18].

The etiology of the higher rates of induction failure among obese women is complex. Obesity is linked to decreased prostaglandin metabolism and myometrial contractility and high levels of inflammatory mediators, which can inhibit the process of cervical ripening and successful uterine contractions [4]. Also, increased adiposity can influence the pharmacokinetics of induction agents like prostaglandins that cause decreased effect and/or reinduction is necessary[10].

The present study revealed maternal weight stratification to have a strong and significant relationship with induction failure among women with an obese weight (< 70 kg) (p<0.001). This demonstrates that weak gains in the weight of the individuals in the obese segment can affect labour performance. The same results also underpin the idea of a dose response due to maternal adiposity and the labour dysfunction[8].

Obesity is also associated with greater obstetric interventions, such as cesarean section, with associated risks of infection, hemorrhage, and thromboembolic risks. The past researches has continually indicated that unsuccessful induction in obese women spells high chances of emergency births, especially when the labour is being delayed or affected by fetal distress. Antenatal counseling and personalized induction planning should, therefore, be important in this high-risk population. [7-9].

The prospective cohort design, adequate sample size, and inclusion criteria make the present study more robust because it minimized the possible confounders associated with the study like high blood pressure and kidney disease. It is however, constrained by the fact that it is a single center study, non-probability consecutive sampling has been employed, and this could have an influence on the generalizability. Also, issues like cervical Bishop score, and precise dosage intervals of induction agents were not examined and this would have given additional light regarding labour outcome[12].

More multicenter studies involving larger populations in the future are suggested to further determine the relationship between the severity of the obese status, cervical status and the effect of induction agents on the patients taking them. More studies are also required to investigate the best induction regimes that are specifically designed to be used when treating obese pregnant women to enhance maternal and fetal outcomes[15].

CONCLUSIONS

This research came up with a conclusion that maternal obesity directly correlates with a high risk of failed induction of labour, in contrast to that of women who are of normal. The relative risks of induction failure were found to be greater with obese patients and this implies that labour induction is less effective in the obese population. The results also indicate that maternal weight may affect the induction outcome and obesity is a significant predictor of failure in the induction. The outcomes here indicate the significance of attentive antenatal evaluation and personalized induction planning amongst obese pregnant women in order to enhance obstetric results[14].

RECOMMENDATIONS

The current research has shown that obesity is linked with a high risk of unsuccessful induction of labour among pregnant women. Thus, a close evaluation of body mass index (BMI) needs to be a significant component of prenatal care. Obese pregnant women need to be educated about the increased risk of induction failure and its possible complications. Clinicians are advised to take into account early risk stratification and tailored labour management plans in obese patients, such as proper choice of induction procedures and increased monitoring in the course of labour. Preconception counseling and weight optimization measures are also to be promoted to minimize obstetric risks associated with obesity. Also, larger, multicenter studies are suggested to investigate effective interventions that can enhance the success rate of induction in obese women.

LIMITATIONS

There are various limitations in this study that must be taken into account when interpreting the findings. To begin with, the sample size was not very large, and this might restrict the extrapolation of the findings. Second, the research was carried out in one center, and it might not be reflective of the practices and population of the patients in other areas or healthcare facilities. Third, non-probability consecutive sampling can be a source of selection bias. Also, the research failed to consider some confounding factors like socioeconomic status, nutritional factors and different clinical practices which might affect the outcome of induction of labour. Besides, the period of follow up was only 24 hours following the induction process and thus, no maternal and neonatal outcomes were determined in the long term.

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