Original Article

Comparison of the Frequency of Failed Induction of Labor in Obese Versus Non-Obese Women with Post-Date Pregnancy

Masooda Rasheed [1], Sobia Nawaz Malik [2], Sara Malik [3], Shazia Syed [4], Hina Hanif [5], Tabinda Khalid [6]

[1,6]Senior Registrar, Dept of Obs and Gynae DHQ hospital Rawalpindi,
[2]Associate Professor, Rawalpindi Medical University, Rawalpindi
[3]Consultant gynecologist, Dept of Obs and Gynae, DHQ hospital Rawalpindi
[4]EX- Professor, Dept of Obs and Gynae, Rawalpindi medical university, Rawalpindi
[5]Associate professor radiology, Rawalpindi medical university, Rawalpindi

Correspondence: *Dr. Sobia Nawaz Malik*
Associate Professor, Rawalpindi Medical University, Rawalpindi
snmgynobs@gmail.com

Abstract

Objective: To compare the frequency of failed induction of labor in obese and non-obese women with post-date pregnancies.
Methodology: This prospective cohort study took place at the Department of Obstetrics and Gynecology in the District Headquarter (DHQ) Hospital Rawalpindi, spanning from January 2020 to December 2020. This study involved 128 pregnant women aged between 18-35 years, presenting with post-date pregnancy (≥42 weeks of gestation), who were categorized as cases (BMI ≥30 Kg/m2) and controls (BMI <30 Kg/m2). The outcome variable was the failure of labor induction, labeled as such if the woman failed to deliver vaginally within 24 hours of induction or if the trial was terminated due to fetal distress. The frequency of failed induction was compared between obese and non-obese women, and relative risk were estimated.
Results: The mean age of the patients was 25.65±3.56 years, while the mean gestational age was 43.27±0.99 weeks. The Bishop score ranged from 1 to 7 with a mean of 3.95±1.90.65 (50.8%) women had a Bishop Score ≤3. Induction of labor failed in 58 (45.3%) women with post-date pregnancy. The frequency of induction failure was significantly higher among obese women compared to non-obese women (59.4% vs. 31.3%; p-value=0.001; 95% CIRR=1.90).
Conclusion: In the present study, maternal obesity was associated with increased risk of induction failure in pregnant women with post-date pregnancy.
Keywords: WBC, Neutrophil/Lymphocyte ratio, FSH, premature ovarian insufficiency.

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Introduction

Labor induction involves starting uterine contractions before they occur naturally, usually after 28 weeks of pregnancy, which leads to cervical dilation, effacement, and ultimately, the delivery of the baby. It is one of the most common procedures used in obstetrics.[1] Labor is induced when the risks of continuing a pregnancy exceed those of its termination, usually performed in the interest of mother and her baby.[2] The mechanisms that governing the process of normal labor are complex; delaying it until full term and initiating it when the baby is mature enough to face the new world.[3] However, labor may fail to initiate on its own, leading to prolongation of gestation, considered normal if it's between 37-42 weeks. Prolonging the gestation further may prove harmful to both the mother and the fetus, necessitating the induction of labor in the best interest of mother and child.[4]

Nevertheless, induction of labor is not always successful, and patients with failed induction require surgical delivery, associated with a range of complications, including hemorrhage, wound infection, and anesthesia complications, among others.[5] Therefore, factors contributing to induction failure are the focus of current

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research, as timely identification and management of women at high risk of induction failure can improve the fetomaternal outcome of such cases. Over the last 25 years, there has been a significant surge in the occurrence of obesity within the general population and among women of childbearing age.[6] In middle- and high-income countries, more than a third of women in their reproductive years are either overweight or obese.[7] Obesity elevates the risk of maternal and neonatal health issues, with pregnant women who are obese facing a greater likelihood of experiencing adverse pregnancy outcomes.[8]

Maternal obesity has already been associated with adverse pregnancy outcomes and evidence suggesting that it increases the risk of induction failure, intensifying the need for cesarean delivery with its associated complications. However, currently, the available evidence is contradictory. Due to this controversy in the existing literature and the lack of local published material on the topic, the need for the present study was felt.

Methodology

The cohort study was carried out at the Department of Obstetrics and Gynecology in the District Headquarter (DHQ) Hospital Rawalpindi during the period from January 2020 to December 2020. A sample size of 128 cases (64 in each group) was determined, with a statistical power of 80% and a 95% confidence interval (two-sided). This sample size calculation was based on the anticipated rates of induction failure, estimated at 57.1% among obese women and 32.2% among non-obese women with post-date pregnancies [9]. Patients were selected through non-probability consecutive sampling. Primigravida aged between 18-35 years with singleton pregnancies (as per dating scan) undergoing induction of labor for post- date pregnancy (as per operational definition) were included in the study. Cases (n=64): Obese women (as per operational definition). Previous caesarean delivery (as per history and clinical record). Non-reassuring CTG at presentation (heart rate <110 or >160bpm, variability <5bpm, or deceleration) and patients with abruption placenta (on ultrasound scan)were excluded from the study.

Following approval from the Hospital's Ethical Review Board. A total of 128 patients who presented with postdate pregnancies and were scheduled for labor induction at the obstetric facility of DHQ Hospital Rawalpindi were approached. These individuals, meeting the specified criteria, were provided with comprehensive information about the study and subsequently consented to participate. Each patient underwent a detailed medical history assessment, and Bishop scoring (Appendix-I) was conducted. The patients were then categorized into two distinct groups based on their BMI: Cases (n=64), which included obese women according to the operational definition, and Controls (n=64), comprising non-obese women, similarly defined.

Induction of labor was performed by intra-cervical Foley's catheter and intra-vaginal dinoprostone as per operational definition. Following induction of labor, patients were monitored for the progression of labor. Failed induction was labeled if the patient failed to deliver vaginally within 24 hours of induction or the trial had to be terminated due to fetal distress (as per operational definition). Women with failed induction were managed as per department protocols i-e. Elective cesarean delivery. All the inductions were performed by a single resident (the candidate herself) under supervision and all the post-induction management was done by a single obstetric team, including the candidate, to eliminate bias. Confounding variables were controlled by exclusion.

All the collected data were entered and analyzed through SPSS version 17. Numerical variables, i.e. age, gestational age, and Bishop Score upon presentation, have been presented as mean ±SD. Categorical variables, i.e. failed induction, has been presented as frequency and percentage. The chi-square test has been applied to compare the frequency of failed induction between obese and non-obese women, taking a p-value of ≤0.05 considered statistically significant, and relative risk (RR) has been calculated. Data has been stratified for age, gestational age, and Bishop Score upon presentation to address effect modifiers. Post-stratification chi-square test, were used to compare the frequency of failed induction between obese and non-obese women, taking a p-value of ≤0.05 was deemed as indicating statistical significance and the relative risk (RR) was re-calculated.

Results

Patients' ages spanned from 18 to 35 years, with a mean of 25.65±3.56 years, while the gestational age of the patients ranged from 42 weeks to 45 weeks, with a mean of 43.27±0.99 weeks. The bishop score ranged from 1 to 7, with a mean of 3.95±1.90. As shown in Table 1, 65 (50.8%) women had a Bishop score of ≤3. Both study groups exhibited similarities in terms of average age (p-value=0.863), mean gestational age (p-value=0.723),

and mean Bishop Score (p-value=0.890). Additionally, there were no significant differences in the

distribution of various subgroups based on patient age (p-value=0.858), gestational age (p-value=0.715), and Bishop Score (p-value=0.860).

Induction of labor failed in 58 (45.3%) women with post-date pregnancy. As shown in Table 2, the frequency of induction failure was significantly higher among obese women compared to non-obese women (59.4% vs. 31.3%; p- value=0.001; 95%CI RR=1.90). Significant similarities were observed between the groups in various patient subgroups based on age, gestational age, and Bishop Score, as detailed in Tables 3 to 5, respectively.

Table I: Baseline Characteristics of Study Groups.

Characteristics	Obese n=64	Non-Obese n=64	P-value
Age (years)	25.59±3.76	25.70±3.38	0.863
18-26 years	37 (57.8%)	36 (56.2%)	0.858
27-35 years	27 (42.2%)	28 (43.8%)	
Gestational Age (weeks)	43.30±0.92	43.23±1.07	0.723
42-43 weeks	39 (60.9%)	41 (64.1%)	0.715
44-45 weeks	25 (39.1%)	23 (35.9%)	
Bishop Score	3.97±1.89	3.92±1.92	0.890
≤3	33 (51.6%)	32 (50.0%)	0.860
>3	31 (48.4%)	32 (50.0%)	

Table II: Comparison of Induction Failure between Obese and Non-Obese Women withPost-Date Pregnancy.

Study Group	Failed Induction		Total	P-value	RR 95% CI
	Yes (n=58)	No (n=70)			
Obese (n=64)	38	26	64		
	59.4%	40.6%	100.0%		
Non-Obese (n=64)	20	44	64		**1.90**
	31.3%	68.8%	100.0%	0.001*	
Total	58	70	128		
	45.3%	54.7%	100.0%		

Table III: Comparison of Induction Failure between Obese and Non-Obese Women with Post-Date Pregnancy across Age Groups.

Age Study Group		Failed Induction Yes (n=58)	No (n=70)	Total	P-value	RR 95% CI
18-26 years (n=73)	Obese	22	15	37		
		59.5%	40.5%	100.0%		
	Non-Obese	11	25	36	0.013*	1.95
		30.6%	69.4%	100.0%		
	Total	33	40	73		
		45.2%	54.8%	100.0%		
27-35 years (n=55)	Obese	16	11	27		
		59.3%	40.7%	100.0%		
	Non-Obese	9	19	28	0.043*	1.84
		32.1%	67.9%	100.0%		
	Total	25	30	55		
		45.5%	54.5%	100.0%		

Table IV: Comparison of Induction Failure between Obese and Non-Obese Women withPost-Date Pregnancy across Gestational Age Groups.

Gestational Age Study Group		Failed Induction Yes (n=58)	No (n=70)	Total	P-value	RR 95% CI
42-43 weeks (n=80)	Obese	23	16	39		
		59.0%	41.0%	100.0%		
	Non-Obese	13	28	41		
		31.7%	68.3%	100.0%		
	Total	36	44	80	0.014*	1.86
		45.0%	55.0%	100.0%		
44-45 weeks(n=48)	Obese	15	10	25		
		60.0%	40.0%	100.0%		
	Non-Obese	7	16	23		
		30.4%	69.6%	100.0%		
	Total	22	26	48	0.040*	1.97
		45.8%	54.2%	100.0%		

Table V. Comparison of Induction Failure between Obese and Non-Obese Women withPost-Date Pregnancy across Bishop Score Groups.

BISHOP Score Study Group		Failed Induction Yes (n=58)	No (n=70)	Total	P-value	RR 95%CI
≤3 (n=65)	Obese	23	10	33		
		69.7%	30.3%	100.0%		
	Non-Obese	13	19	32		
		40.6%	59.4%	100.0%		
	Total	36	29	65		
		55.4%	44.6%	100.0%	0.018*	1.72
>3 (n=63)	Obese	15	16	31		
		48.4%	51.6%	100.0%		
	Non-Obese	7	25	32		
		21.9%	78.1%	100.0%		
	Total	22	41	63		
		34.9%	65.1%	100.0%	0.027*	2.21

Discussion

Post-date pregnancy defined as pregnancy extending to 42 weeks of gestation or beyond, has historically been associated with underestimated fetal, neonatal, and maternal complications.[10] Managing post-term pregnancy presents a challenge to clinicians, involving decisions about induction or cesarean section. Recent studies have suggested an increased risk of induction failure in obese women with post-date pregnancies. However, there is controversy in the existing literature [9, 11, 12] and limited local research on the topic necessitated the present study.

The study reported that the average age of the patients was 25.65±3.56 years. Similar mean ages of 25.90±7.10

years (Usman et al.), reported at Lady Reading Hospital Peshawar, 26.41±3.87 years (Shafiq et al.), reported at Jinnah Postgraduate Medical Centre Karachi.[14] 26.34±5.28 years (Fatima et al.), reported at Divisional Head Quarter Hospital, Faisalabad and, 27.75±3.94 years (Iqbal et al.) have been reported at Jinnah Postgraduate Medical Centre Karachi in the similar patient population.[15, 16] A much younger mean age of 22±5.2 years was reported by Abbasi et al. at Shaheena Jamil Teaching Hospital, Abbottabad.[17] In Indian populations, Kumari et al. and Sharma et al. reported mean ages of 25.9±5.2 years and 24.12±3.47 years respectively.[18, 19]

The Bishop Score among these women in our study ranged from 1 to 7, with a mean of 3.95±1.90. This observation is consistent with that of Madaan et al. and Shivarudraiah et al., who reported similar mean Bishop Score of 3.86±1.58 and 3.01±1.38 respectively among Indian women undergoing induction of labor.[20, 21] Shafiq et al. and Abbasi et al. reported it to be 2.36±0.23 and 4.3±1.2 respectively in local population.[14, 17.]

In this study, the frequency of induction failure was significantly higher among obese women as compared to non-obese women (59.4% vs. 31.3%; p-value=0.001; 95%CI RR=1.90).

Significant resemblances were noted between the groups within various subgroups of patients based on age, gestational age, and Bishop Score.

This observation aligns with a local study by Yousaf et al. reported similar significantly higher frequency of induction failure in obese as compared to non-obese women with post-date pregnancy (57.1% vs. 32.2%; p<0.001).[9] Our observation is also in line with that of Zelig et al. who too observed comparable significantly higher frequency of induction failure in obese women with post-date pregnancies (57% versus 39%; p<0.05).[22]

The study contributes to the limited local research on this topic. It highlights the association between maternal obesity and an increased risk of induction failure in pregnant women with post-date pregnancies, emphasizing the need for routine identification of such women as poor candidates for labor induction. This allows for early identification and planned management to improve the fetomaternal outcomes. Unlike a previous report by Zelig et al. which observed significance only in women with poor Bishop Scores, our study found that obesity was associated labor induction failure regardless of Bishop Score (≤3 vs. >3;)[22] Thus, obese women even with a promising Bishop Score at the beginning, may not progress to delivery after induction and more to undergo likely in cesarean delivery. This underscores the significance of BMI assessment and subsequent management planning for women with post- date pregnancies.

Limitation: A notable drawback of the current study is the omission of other measures related to fetomaternal outcomes, especially in the context of failed induction. Exploring the measures could further underscore the importance of appropriate planning and elective cesarean delivery for such women. This type of study is strongly encouraged for future research endeavors.

Conclusion

The current study revealed that maternal obesity was associated with increased risk of induction failure in pregnant women with post-date pregnancy which warrants routine identification of such women as poor candidate for labor induction so that early identification and proactive intervention could lead to better fetomaternal outcomes in such cases.

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