Original Article
DOI: https://doi.org/10.70749/ijbr.v3i7.2815

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://ijbr.com.pk
ISSN: 2960-2793/ 2960-2807

Risk Factors of Vesicovaginal Fistula in Obstetrics

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ARTICLE INFO

Keywords: Cesarean Section, Labor Complications, Parturition, Obstetric Fistula, Risk Factors

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Declaration
Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History
Received: 04-06-2025 Revised: 28-06-2025
Accepted: 07-07-2025 Published: 10-07-2025

ABSTRACT

Background: Vesicovaginal Fistula is an obstetric complication that mainly affects women during the postpartum period in resource-poor areas worldwide. Fistulae lead to the leakage of urine into the vagina constantly, resulting in discomfort for the patient and creating feelings of shame for the sufferer. These include prolonged labor and operative delivery. **Objective:** To determine the frequency of obstetric risk factors associated with vesicovaginal fistula in women presenting to a tertiary care hospital. **Study Design:** Cross sectional study. **Duration and Place of Study:** This study was conducted from February 2025 to May 2025 in the Department of Obstetrics and Gynecology, Lady Reading Hospital, Peshawar. **Methodology:** A total of 121 women aged 18 to 40 years with vesicovaginal fistula were included. Risk factors including obstructed labour, C-section, and forceps delivery were assessed. Data analysis was done using Statistical Package for Social Sciences version 25. Association between risk factors and demographic variables was assessed using Chi square test and Fischer Exact test. A p-value ≤0.05 was considered significant. **Results:** The mean age was 28.12±6.66 years. Obstructed labour was the most common risk factor seen in 69.40% patients, followed by C-section in 33.10% and forceps delivery in 14.00%. No statistically significant association was found between demographic variables and risk factors (p>0.05). **Conclusion:** Obstructed labour remains the leading risk factor for vesicovaginal fistula.

INTRODUCTION

Vesicovaginal fistula, as a medical condition, has been found to mainly affect women after parturition.[1] The condition has been medically defined as "an abnormal connection that occurs between the urinary bladder and the vagina, where continuous urinary leakage occurs from the urinary bladder through the vaginal canal."[2] The medical condition of vesicovaginal fistula has been found to cause considerable physical discomfort in women. From a physical standpoint, vesicovaginal fistula has been found to cause considerable irritation to women.[3] The affected individuals also have to live through considerable mental trauma, as they are also affected from a mental standpoint.[4] The affected women have been found to live in considerable social shame.

Obstructed labor is considered to be one of the major risk factors for the occurrence of a vesicovaginal fistula.[5] This is because prolonged labor, which stretches for hours or even days, causes the constant pressure from the presenting part of the fetus to the bladder wall and the vaginal wall.[6] This eventually leads to a lack of oxygen supply to the tissues, causing necrosis and the end result being a fistula. Obstructed labor tends to occur more commonly in women who labor at home, are not assisted by skilled birth attendants, or are delayed in reaching health facilities.[7] In addition to this, a lack of maternal nutrition, young age at the time of pregnancy, and a small pelvic size are some of the risk factors for obstructed labor. In developing countries, obstructed labor is considered to be the major cause for the occurrence of a vesicovaginal fistula because of the lack of prenatal care.[8]

Cesarean delivery and forceps delivery are noted as significant risk factors for vesicovaginal fistula.[9] This is especially true in emergency settings or if these are done by less expert practitioners. Injuries to the bladder during cesarean delivery are usually caused by difficulty in pelvic anatomy, heavy blood loss, and adhesions.[10] This can subsequently cause vesicovaginal fistula if not properly repaired. Forceps delivery can also cause injuries to the bladder and vagina due to heavy force applied to the baby's head.[11] Misuse of forceps, a prolonged second stage of labor, and delay in deciding to perform an operative delivery are known contributing factors.[12] Though these are not as prevalent as obstructed labor, these are still significant contributors to vesicovaginal fistula. A study observed the risk factors for vesicovaginal fistula such as obstructed labour in 63.33%, C-section in 13.33%, and forceps delivery in 3.33%.[13]

Vesicovaginal fistula thus continues to be an important yet underreported health issue in resource-constrained

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environments. Peshawar is particularly noteworthy due to the high rates of home births, scarcity of emergency care facilities as well as socio-cultural impediments to timely care-seeking services. Yet the local epidemiology of vesicovaginal fistula risk factors is still in short supply. Determining the risk factors related to obstetric, socio-demographic as well as health service delivery domains is vital to inform the prevention of vesicovaginal fistula as well as to improve maternal health services while minimizing the long-term health effects of the condition.

METHODOLOGY

This cross-sectional study was carried out in the Department of Obstetrics and Gynecology Lady Reading Hospital Peshawar from 5 February 2025 to 10 May 2025. Approval for the study was obtained from the Ethical Committee of the hospital and also from the research department of CPSP. The sample size was calculated by using the WHO sample size calculator. The assumptions used were frequency of forceps delivery 3.33%,[13] confidence level 95%, and absolute precision 3.2%. The calculated sample size was 121. Patients were enrolled through consecutive non-probability sampling technique. Women aged from 18 to 40 years who presented with vesicovaginal fistula were included in the study. Vesicovaginal fistula was considered present when patients had continuous urine leakage along with foul-smelling vaginal discharge and abdominal pain with visual analogue scale score more than 3. Patients having gynecological vesicovaginal fistula, women with concurrent urethral fistula or rectovaginal fistula and those having compromised immune system were excluded from the study. Before data collection the purpose of the study was explained to all eligible patients and it was clarified that no additional risk was involved. Written informed consent was taken from each participant prior to inclusion. Demographic information was recorded including age, socio-economic background and place of residence. Information regarding diabetes and hypertension was also documented.

A detailed medical history was recorded. This was followed by a physical examination. Next, all patients were assessed with respect to risk factors, including obstructed labor, cesarean delivery, and forceps delivery. The assessment was carried out under the close supervision of a consultant obstetrician. The entire process was recorded on a proforma. The risk factors were defined as obstructed labor, i.e., failure of descent of presenting parts through the birth canal in response to strong uterine contractions. Cesarean delivery was defined as a baby delivered through a surgical incision through the abdomen and uterus. Forceps delivery was defined as a baby delivered by applying traction to the head with a pair of obstetric forceps.

Data analysis was done using SPSS version 25. Numerical variables including age, weight, height, and BMI were presented as mean ± standard deviation. Categorical variables such as obstructed labour, C-section, forceps delivery, socio-economic background, place of residence, diabetes and hypertension were presented as frequencies and percentages. Effect modifiers including age, BMI, socio-economic background, place of residence, diabetes and hypertension were controlled through stratification.

RESULTS

The study included 121 patients with mean age of 28.12±6.66 years, mean weight was 73.27±10.52 kg, mean height was 1.60±0.06 m, and mean BMI was 28.74±3.46. Regarding socioeconomic status, 11 patients (9.1%) was from upper class, 57 patients (47.1%) was from middle class, and 53 patients (43.8%) was from lower class. Majority of patients was from rural areas with 75 patients (62.0%) while 46 patients (38.0%) was from urban areas. Diabetes was present in 11 patients (9.1%) and absent in 110 patients (90.9%). Hypertension was found in only 3 patients (2.5%) whereas 118 patients (97.5%) was not having hypertension (as shown in Table 1).

Table 1

Patient Demographics

Demographics		Mean ± SD
Age (years)		28.12±6.66
Weight (kg)		73.27±10.52
Height (m)		1.60±0.06
BMI		28.74±3.46
Socioeconomic Status	Upper n (%)	11 (9.1%)
	Middle n (%)	57 (47.1%)
	Lower n (%)	53 (43.8%)
Residence	Rural n (%)	75 (62.0%)
	Urban n (%)	46 (38.0%)
Diabetes	Yes n (%)	11 (9.1%)
	No n (%)	110 (90.9%)
Hypertension	Yes n (%)	3 (2.5%)
	No n (%)	118 (97.5%)

The most common risk factor for vesicovaginal fistula was obstructed labour which was present in 84 patients (69.40%). C-section was performed in 40 patients (33.10%) and forceps delivery was done in 17 patients (14.00%) (as shown in Table 2).

Table 2

Frequency of Risk Factors of Vesicovaginal Fistula in Obstetrics

Risk Factors	Frequency	% age
Obstructed Labour	84	69.40%
C-section	40	33.10%
Forceps Delivery	17	14.00%

When obstructed labour was analyzed with demographic factors, it was found that 52 patients (75.4%) aged ≤30 years had obstructed labour compared to 17 patients (24.6%) who did not have it, while 32 patients (61.5%) aged >30 years had obstructed labour compared to 20 patients (38.5%) without it, with p-value of 0.102 showing no significant association. Regarding socioeconomic status, 10 patients (90.9%) from upper class had obstructed labour versus 1 patient (9.1%) without it, 40 patients (70.2%) from middle class had it versus 17 patients (29.8%) without it, and 34 patients (64.2%) from lower class had it versus 19 patients (35.8%) without it, with p-value of 0.231 indicating no significant association. Among rural patients, 49 (65.3%) had obstructed labour and 26 (34.7%) did not have it, while among urban patients 35 (76.1%) had it and 11 (23.9%) did not have it,

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with p-value of 0.213 showing no significant difference. For diabetic patients, 7 (63.6%) had obstructed labour and 4 (36.4%) did not, whereas among non-diabetic patients 77 (70.0%) had it and 33 (30.0%) did not, with p-value of 0.735. Regarding hypertension, only 1 patient (33.3%) with hypertension had obstructed labour while 2 (66.7%) did not, compared to 83 patients (70.3%) without hypertension who had obstructed labour and 35 (29.7%) who did not, with p-value of 0.221 (as shown in Table 3).

Table 3
Association of Obstructed Labour with Demographic Factors

Demographic Factors		Obstructed Labour		p-value
		Yes n(%)	No n(%)	
Age (years)	≤30	52 (75.4%)	17 (24.6%)	0.102
	>30	32 (61.5%)	20 (38.5%)	
Socioeconomic Status	Upper	10 (90.9%)	1 (9.1%)	0.231*
	Middle	40 (70.2%)	17 (29.8%)	
	Lower	34 (64.2%)	19 (35.8%)	
Residence	Rural	49 (65.3%)	26 (34.7%)	0.213
	Urban	35 (76.1%)	11 (23.9%)	
Diabetes	Yes	7 (63.6%)	4 (36.4%)	0.735*
	No	77 (70.0%)	33 (30.0%)	
Hypertension	Yes	1 (33.3%)	2 (66.7%)	0.221*
	No	83 (70.3%)	35 (29.7%)	

*Fischer Exact Test

For C-section, 23 patients (33.3%) aged ≤30 years had C-section while 46 patients (66.7%) did not, and 17 patients (32.7%) aged >30 years had C-section while 35 patients (67.3%) did not, with p-value of 0.941 showing no significant association. Among upper class, 4 patients (36.4%) had C-section and 7 (63.6%) did not, among middle class 16 patients (28.1%) had it and 41 (71.9%) did not, and among lower class 20 patients (37.7%) had it and 33 (62.3%) did not, with p-value of 0.582. Among rural patients, 26 (34.7%) had C-section and 49 (65.3%) did not, while among urban patients 14 (30.4%) had it and 32 (69.6%) did not, with p-value of 0.631. Among diabetic patients, 3 (27.3%) had C-section and 8 (72.7%) did not, whereas among non-diabetic patients 37 (33.6%) had it and 73 (66.4%) did not, with p-value of 0.751. For hypertensive patients, 1 (33.3%) had C-section and 2 (66.7%) did not, while among non-hypertensive patients 39 (33.1%) had it and 79 (66.9%) did not, with p-value of 1.000 (as shown in Table 4).

Table 4
Association of C-section with Demographic Factors

Demographic Factors		C-section		p-value
		Yes n(%)	No n(%)	
Age (years)	≤30	23 (33.3%)	46 (66.7%)	0.941
	>30	17 (32.7%)	35 (67.3%)	
Socioeconomic Status	Upper	4 (36.4%)	7 (63.6%)	0.582*
	Middle	16 (28.1%)	41 (71.9%)	
	Lower	20 (37.7%)	33 (62.3%)	
Residence	Rural	26 (34.7%)	49 (65.3%)	0.631
	Urban	14 (30.4%)	32 (69.6%)	
Diabetes	Yes	3 (27.3%)	8 (72.7%)	0.751*
	No	37 (33.6%)	73 (66.4%)	
Hypertension	Yes	1 (33.3%)	2 (66.7%)	1.000*
	No	39 (33.1%)	79 (66.9%)	

**Fischer Exact Test*

Regarding forceps delivery, 12 patients (17.4%) aged ≤30 years had forceps delivery while 57 patients (82.6%) did not, and 5 patients (9.6%) aged >30 years had it while 47 patients (90.4%) did not, with p-value of 0.294. Among upper class, 3 patients (27.3%) had forceps delivery and 8 (72.7%) did not, among middle class 7 patients (12.3%) had it and 50 (87.7%) did not, and among lower class 7 patients (13.2%) had it and 46 (86.8%) did not, with p-value of 0.506. Among rural patients, 12 (16.0%) had forceps delivery and 63 (84.0%) did not, while among urban patients 5 (10.9%) had it and 41 (89.1%) did not, with p-value of 0.592. Among diabetic patients, 1 (9.1%) had forceps delivery and 10 (90.9%) did not, whereas among non-diabetic patients 16 (14.5%) had it and 94 (85.5%) did not, with p-value of 0.707. For hypertensive patients, none (0.0%) had forceps delivery while 3 (100.0%) did not, compared to 17 patients (14.4%) without hypertension who had forceps delivery and 101 (85.6%) who did not, with p-value of 1.000 (as shown in Table 5).

Table 5
Association of Forceps Delivery with Demographic Factors

Demographic Factors		Forceps Delivery		p-value
		Yes n(%)	No n(%)	
Age (years)	≤30	12 (17.4%)	57 (82.6%)	0.294*
	>30	5 (9.6%)	47 (90.4%)	
Socioeconomic Status	Upper	3 (27.3%)	8 (72.7%)	0.506*
	Middle	7 (12.3%)	50 (87.7%)	
	Lower	7 (13.2%)	46 (86.8%)	
Residence	Rural	12 (16.0%)	63 (84.0%)	0.592*
	Urban	5 (10.9%)	41 (89.1%)	
Diabetes	Yes	1 (9.1%)	10 (90.9%)	0.707*
	No	16 (14.5%)	94 (85.5%)	
Hypertension	Yes	0 (0.0%)	3 (100.0%)	1.000*
	No	17 (14.4%)	101 (85.6%)	

*Fischer Exact Test

DISCUSSION

The findings show that obstructed labour was most common risk factor present in 84 patients (69.40%), followed by C-section in 40 patients (33.10%) and forceps delivery in 17 patients (14.00%). These results is consistent with existing literature where obstructed labour remain the leading cause of vesicovaginal fistula in developing countries. Obstructed labour leads to prolonged compression of bladder tissue between fetal head and maternal pelvis which cause ischemia and subsequent tissue necrosis. When labour is prolonged for many hours without proper intervention, the continuous pressure disrupts blood supply to bladder wall and vaginal tissue, resulting in formation of fistula after tissue sloughing occur. This mechanism explain why obstructed labour was responsible for majority of cases in current study. C-section was found in 33.10% of patients which indicate that iatrogenic injury during surgical procedure also contribute to fistula formation. During caesarean section, inadvertent bladder injury can happen due to poor surgical technique, difficult anatomy, or emergency situations where previous caesarean section had created adhesions. The bladder is particularly vulnerable at lower uterine segment where incision is made, and unrecognized injury during surgery lead to fistula development in postoperative period. Forceps delivery was associated

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with 17 patients (14.00%) which suggest that instrumental delivery also pose risk for vesicovaginal fistula. Application of forceps create additional pressure and trauma to pelvic structures, especially when delivery is difficult or operator is inexperienced. The mechanical trauma from forceps blade can directly injure bladder or cause tissue damage that later breakdown into fistula.

The present study found obstructed labour as most common risk factor in 84 patients (69.40%) which is similar to findings of Tariq *et al.* [14] who reported obstructed labour in 40% cases, Amjad *et al.* [15] who found it in 56% cases, and Shafqat *et al.* [16] who identified obstetrical causes particularly obstructed labour in 86.84% patients. Similarly, Yaay *et al.* [17] also reported obstructed labour as main cause with 22 cases from spontaneous vaginal delivery and 13 from cesarean section. This consistency across different studies is because prolonged obstructed labour create ischemic necrosis of tissue due to compression between fetal head and maternal pelvis, which remain universal mechanism of fistula formation regardless of geographical location. However, the percentage of obstructed labour in current study was higher compared to Tariq *et al.* [14] and Amjad *et al.* [15] which may be attributed to delayed presentation to healthcare facilities and limited access to emergency obstetric care in study population where majority was from rural areas 75 patients (62.0%) and lower socioeconomic class 53 patients (43.8%). This delay in receiving proper medical attention allow labour to progress for prolonged duration, increasing likelihood of complications. C-section was found in 40 patients (33.10%) in present study which is comparable to Tariq *et al.* [14] who also reported cesarean section as cause in 40% cases and Yaay *et al.* [17] who found 13 cases from cesarean section. This similarity suggests that iatrogenic injury during surgical procedure contribute significantly to VVF formation. The bladder injury during C-section can occur due to emergency situations, poor surgical technique, or adhesions from previous surgeries, and when such injury go unrecognized during operation, it lead to fistula in postoperative period. Forceps delivery was associated with 17 patients (14.00%) in current study, however this specific risk factor was not prominently discussed in comparison studies. The mechanical trauma from instrumental delivery create additional pressure on pelvic structures which can damage bladder tissue, particularly when operator lack experience or delivery is difficult.

Istighfarin *et al.* [18] identified delivery method (p=0.029), birth weight (p=0.029), and history of gynecological surgery (p=0.038) as significant risk factors, whereas present study did not find significant association between demographic factors and main risk factors (p>0.05). This difference may be due to smaller sample size or different study design. James *et al.* [19] found that previous VVF, X-ray of pelvis, and physical examination significantly increase VVF odds, while hospital delivery reduced odds, which emphasize importance of proper healthcare access that was lacking in majority of patients in current study. The mean age in present study was 28.12±6.66 years which is lower compared to Bashir *et al.* [20] who reported mean age of 37.04±6.79 years in their study on postoperative urinary incontinence after VVF repair. The mean BMI in current study was 28.74±3.46 which is considerably higher than Bashir *et al.* [20] who found mean BMI of 22.25±2.13 kg/m^2. This difference in BMI may be due to different dietary patterns and lifestyle factors in study populations.

Majority of patients in present study was from rural areas and lower socioeconomic status which is consistent with Tariq *et al.* [14] who reported most patients was illiterate and from poor urban backgrounds, and Yaay *et al.* [17] who found majority of women was illiterate and classified as poor. This similarity across studies indicate that VVF predominantly affect women from disadvantaged backgrounds where access to quality healthcare, education about danger signs in pregnancy, and timely medical intervention is limited. Ingwu *et al.* [21] emphasized need for intensified health education and discouraging early marriage to improve awareness, which support notion that lack of knowledge and poor socioeconomic conditions contribute to higher incidence of VVF in these populations.

There are various limitations to the study. These include the fact that the study was based on a single population in a single health institution. Thus, the study cannot be generalized to the rest of the population. Moreover, the population in the study consisted of only 121 patients. Although the patients in the study had various demographic factors and risk factors, the study may not have been sufficient to show significant associations due to the relatively few patients. Moreover, the patients in the study were not followed to evaluate the outcome of the repair procedure.

CONCLUSION

The present study has come to a conclusion that obstructed labor is the most common risk factor in obstetric care, and it is followed by cesarean section and forceps delivery. The majority of patients were from rural areas and had a lower and middle socioeconomic status. This suggests that inaccessibility of health care and delayed presentation are major factors in causing obstetric fistula.

Disclaimer: Nothing to declare.

Acknowledgement: The authors want to thank the hospital staff of the department. Their help in keeping patient files and handling records properly made this study possible.

Ethical Permission: This research was approved by the ethical committee. All works was carried out by following committee guidelines and international ethical rules.

Patients' Consent: Consent was taken in written form from all patients before including them in the study. They were informed that their personal data would be kept confidential and that participation was fully optional.

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