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Association of Puerperal Sepsis with Income Level, Booking Status, and Mode of Delivery Among Patients at A Tertiary Care Setting

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ABSTRACT

According to the World Health Organization (WHO), puerperal sepsis is a contracted infection of the genital tract that occurs during labor or in a period of 42 days following the birth. It is the leading cause of preventable maternal disease and death in rich and poor countries. In Pakistan, it ranks third after hemorrhage and hypertensive diseases among women. **Objectives:** To determine the association of puerperal sepsis with booking status and mode of delivery among patients admitted at the Department of Obstetrics, Shaikh Zaid Women Hospital, Larkana. **Methods:** The study included 170 patients with puerperal sepsis in total. Demographic data were collected, including age, parity, socioeconomic position, and time since delivery. All the collected data were entered and analyzed using SPSS version 26.0. **Results:** According to the findings of this study, the mean age was 28.96 ± 6.41 years, the mean time since delivery was 22.11 ± 5.68 days, the mean parity was 1.58 ± 0.895, and the mean BMI was 24.51 ± 4.43. 103 (60.59%) patients were primigravida. 81 (47.65%) patients reported a monthly income of less than 50 thousand, and 81 (47.65%) patients reported a delay of more than 28 days. The income level (p-value=0.018) and mode of delivery (p-value=0.04) were found to have a significant association with puerperal sepsis. **Conclusions:** The puerperal sepsis is found to have a significant association with the caesarean section deliveries, income level, and case which remain un-booked during pregnancy.

INTRODUCTION

According to the WHO, puerperal sepsis is a genital tract infection that typically manifests itself within 6 weeks after birth [1]. It is also the second largest cause of maternal death in Pakistan and the cause of 11% maternal deaths in the world [2]. In Pakistan and other developing nations, possible risk factors that lead to the development of puerperal sepsis include the mode of delivery, Socioeconomic status, and chronic maternal disease [3]. Some of the common predisposing factors of puerperal sepsis include anemia, prolonged labour, vaginal check-ups in unsterilized conditions, and premature membrane rupture after long periods of time [4]. General sepsis is one of the leading 3 causes of pregnancy-related mortality in the world, with sepsis constituting about 10.7 per cent of pregnancy-related mortality in low and middle-income nations and 4.7 per cent of pregnancy-related mortality in

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high-income states [5]. Puerperal sepsis, a severe maternal infection often originating in the genital tract, is typically polymicrobial, involving both aerobic and anaerobic microorganisms. Escherichia coli is frequently identified as a major causative agent [6]. This serious public health issue is perpetuated in Pakistan by a combination of factors: deliveries by untrained traditional birth attendants (Dais), the insertion of foreign objects into the vagina as a traditional practice, and significant delays in accessing healthcare facilities due to transportation and resource limitations. When compounded by cultural factors that inhibit timely care-seeking, these elements pose a substantial challenge to the nation's overburdened healthcare system [7]. According to two separate studies, one from South Africa and one from Nigeria, caesarean sections are responsible for 12.5% and 25.6% of occurrences of puerperal sepsis, respectively, making them one of the most significant risk factors for the condition. Despite the use of preventative antibiotics, the prevalence of puerperal sepsis has increased. Puerperal sepsis rates are relatively low in different countries, with poorer countries recording higher rates. Puerperal sepsis is common in Asia, with a prevalence of 11.6%, in Africa, with a prevalence of 9.7%, in South America, with a prevalence of 7.7%, and in Caribbean countries with a prevalence of 7.7 [8]. Broad-spectrum parenteral antibiotics are often used as treatment until the patient is afebrile for 24 to 48 hours. Septicemia, endotoxin shock, peritonitis, abscess development, subfertility, and even death are possible maternal outcomes. Low Apgar scores, newborn septicemia, and pneumonia are examples of fetal effects. The use of antibiotics, aseptic measures, and improvements in investigative techniques have all contributed significantly to the decrease in puerperal infections [9].

There is no puerperal sepsis research conducted recently in Larkana, Sindh. There is no local information on the correlation with income, booking condition, and delivery mode that could be used to prevent it directly. Therefore, the objective of the study is to evaluate the association of income level, booking status, and mode of delivery with puerperal sepsis among patients admitted to Shaikh Zaid Women Hospital, Larkana.

METHODS

The analytical cross-sectional study was carried out at the Department of Gynaecology and Obstetrics, Shaikh Zaid Women Hospital, Larkana, during the period April 2024 to December 2024. The ethical approval was taken from Shaheed Mohtarma Benazir Bhutto Medical University with IRB ref no: SMBBMU/ORIC/2024. The 170 patients who were chosen in the study were using a nonprobability consecutive sampling technique and comprised those who had been hospitalized with puerperal sepsis. The sample size was calculated based on the WHO sample size calculator with 95% confidence level, a 12.5% expected population proportion, and a 5% absolute precision requirement. All patients aged between 20 years and 45 years, either multipara or primigravida, and fitting the definition of puerperal sepsis were included in the study. The diabetic and obese patients, immunosuppressed patients, patients with chronic illness, and patients presenting after 42 days of delivery were excluded from the study. One hundred and seventy individuals with puerperal sepsis were made part of this cross-sectional study after obtaining ethical approval from the hospital ethical review committee. Each patient gave their written informed consent after being briefed on the study's methodology. Demographic data were collected from patients' files and integrated for the patient or the attendant, including age, parity, socioeconomic position, and time since delivery, booking status, and mode of delivery. Ages were recorded in years, parity was recorded in numbers, weight was recorded in kilograms, and height was recorded in meters. BMI was calculated from height and weight; however, Age, time since delivery, and parity were further converted to categorical variables in SPSS. The status of the booking was inquired about from the patients while taking their history. Those patients who attended regular visits for assessment of fetal well-being at the antenatal clinic during pregnancy were labelled as booked cases; those cases who didn't attend regular assessment visits were labelled as un-booked cases. Mode of delivery was recorded from the patient's file as SVD (Spontaneous Vaginal Delivery) Instrumental delivery, and Cesarian Section. The Economic level was inquired from the patients and divided into two categories: less than 50000 per month and more than 50000 per month.

The data were entered and analyzed using SPSS version 26.0 for data analysis, while employing the Chi-Square test of association. For the quantitative variables like age, parity, and time since delivery, we used the mean and SD. For the variables like un-booked status and caesarean section patients, which are qualitative variables, the study reported the results in frequency and percentages. The study controlled the effect modifiers while determining the association tests, to evaluate the strength of the association, the Chi-square test was applied, taking p-value<0.050 as significant.

RESULTS

According to the findings of this study, the mean age was 28.96 ± 6.41 years, the mean time since delivery was 22.11 ± 5.68 days, the mean parity was 1.58 ± 0.895, and the mean BMI was 24.51 ± 4.43, as presented in table 1.

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Table 1: Descriptive Statistics of the Study Participants (n=170)

Variables	Min	Max	Mean ±SD	95% CI
Age (Y)	19	44	28.96 ± 6.41	27.99-29.94
Time Since Delivery (days)	4.5	28.5	22.11 ± 5.683	21.25-22.97
Parity	1	4	1.58 ± 0.895	1.45-1.72
Weight	45.5	93	58.34 ± 9.45	56.71-59.22
BMI	19.22	31.67	24.51 ± 4.43	22.87-25.91

In this study, most of the participants, 75 (44.12%), were aged below 25 years, followed by 53 (31.18%) patients aged between 31 years and 45 years. The remaining 42 (24.71%) patients were aged between 26 years and 30 years, as depicted in figure 1.

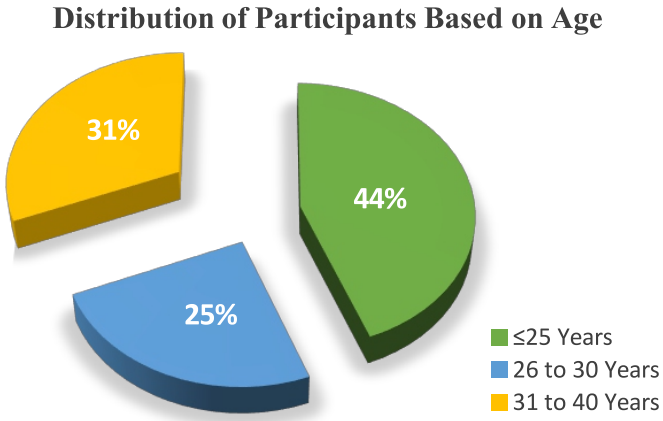

Figure 1: Distribution of Participants Based on Age

Most of the participants were aged below 25 years; 81 (47.65%) patients reported a delay of more than 24 days, followed by 37.06% patients reporting a delay of less than 20%. In this study, 103 (60.59%) patients were primigravida. 81 (47.65%) patients reported a monthly income of less than 30 thousand, as shown in table 2.

Table 2: Distribution of Study Participants Based on Sociodemographic Factors

Study Variables		Frequency (%)
Age Groups	≤25 Years	75 (44.12%)
	26 to 30 Years	42 (24.71%)
	31 to 45 Years	53 (31.18%)
Time Since Delivery (Days)	<15 Days	63 (37.06%)
	15 To 24 Days	26 (15.29%)
	>28 Days	81 (47.65%)
Parity	Primiparity	103 (60.59%)
	Multiparity	67 (39.41%)
Income Level Per (PKR Per Month)	Less than 50,000	81 (47.65%)
	More than 50,000	89 (52.35%)
Status of Booking	Booked	56 (32.9%)
	Un-booked	114 (67.1%)
Mode of Delivery	SVD	57 (33.5%)
	Instrumental Delivery	29 (17.1%)
	Caesarean Sections	84 (49.4%)

The chi-square test of association was employed to evaluate the association of various factors affecting the booking status in patients with puerperal Sepsis. Amongst several variables under the study, only income level showed a significant association (0.018) with booking status among patients reporting with puerperal Sepsis, as shown in Table 3.

Table 3: Chi-Square Association of Various Factors with Status of Booking During Antenatal Period

Factors		No	Booking Status		p-value
			Yes	No	
Age Groups	≤25 Years	75	51 (68%)	24 (32%)	0.380
	26 to 30 Years	42	25 (29.5%)	17 (40.5%)	
	31 to 45 Years	53	30 (56.6%)	23 (43.4%)	
Time Since Delivery (Days)	<15 Days	63	38 (60.3%)	25 (39.7%)	0.890
	15 To 24 Days	26	17 (65.4%)	9 (34.6%)	
	>28 Days	81	51 (63%)	30 (37%)	
Parity	Primiparity	103	64 (62.1%)	39 (37.9%)	0.940
	Multiparity	67	42 (62.7%)	25 (37.3%)	
Income Level Per (PKR Per Month)	Less than 50,000	81	58 (71.6%)	23 (28.4%)	0.018**
	More than 50,000	89	48 (53.9%)	41 (46.1%)	
Mode of Delivery	SVD	57	28 (49.1%)	29 (50.9%)	0.040**
	Instrumental Delivery	29	15 (51.7%)	14 (48.3%)	
	Caesarean Sections	84	25 (29.8%)	59 (70.2%)	

DISCUSSION

The world has 4.4 cases of puerperal sepsis per 100 live babies [10]. The statistics available to the WHO have put puerperal sepsis as the second cause of maternal death in developing countries. One of the studies showed that sepsis is nearly the cause of 15 percent of deaths among mothers in South Asia [11]. Recently WHO was able to designate maternal sepsis as a terrible illness resulting in organ dysfunction, which results in infection throughout pregnancy, intrapartum, post-abortion, and postpartum phases [12]. In case of critical sepsis, failure of the organs, insufficient perfusion of the cells, low blood pressure, and the syndrome of systemic inflammatory response may occur, which is supported by infections [13]. As of our findings in the very study, amongst the women aged between 20years to 40 years, the mean age was 28.96 ± 6.41 years. Most of the women (68%) were aged below 30 years. Nearly 2/5th (39.41%) was multipara, and the rest were primipara. In line with our findings, a study in the same country reported that 83.3% women experiencing puerperal sepsis were aged less than 30 years [11]. Due to a lack of knowledge about health care and financial challenges, instead of giving birth in a medical facility with adequate staff, the young and inexperienced mothers frequently end up in the hands of traditional birth attendants and give birth outside of a facility, increasing the risk for sepsis. According to our research, mothers from lower socioeconomic backgrounds had a much greater rate of puerperal sepsis. Low socioeconomic level

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was found to be a key un-booked factor contributing to puerperal sepsis in our study. The probability of developing sepsis is higher in women with low socioeconomic status, which is in line with recent research results [14]. A different study carried out in Ethiopia established that mothers who have lower family income are likely to develop puerperal sepsis [15]. According to this study, the primiparous mothers are more likely to endure protracted labor and trials in different hands. There is strong evidence of association of puerperal sepsis with prolonged labor among young women with lower parity. According to a study, the risk of developing puerperal sepsis is greater among mothers with fewer than five children, particularly primiparous women. This vulnerability is often attributed to their tendency to experience protracted labour and undergo numerous manual examinations before hospital admission [16]. The most significant contributing factor to puerperal sepsis exhibiting symptoms in 170 individuals was determined to be un-booked cases (62.35%). During the index pregnancy, most of the women in this research had no record of having prenatal care visits. In line with our study conducted in Hoima District, Uganda reported that puerperal sepsis was more frequent among un-booked mothers; the data showed that (64.7%) cases developed puerperal sepsis were un-booked [17]. The importance of early antenatal care (ANC) booking for positive maternal, fetal, and neonatal outcomes is well-established. In contrast, a lack of booking for antenatal care is a significant risk factor associated with elevated fetal and neonatal mortality and morbidity, as well as greater maternal morbidity [18]. Underscoring antenatal care with an equal importance similar to antepartum hemorrhage APH which established predictor of puerperal sepsis among post-natal mothers [19, 20].

Together with all the associated factors discussed in the study, the limited availability of local healthcare infrastructure in remote areas, poverty, poor literacy rate, and cultural practices in Larkana might explain differences from other regional studies. Introduce surveillance systems, focus on low-income/un-booked women, advocate aseptic institutional birth, formulate cesarean infection guidelines, and conduct multicenter studies.

CONCLUSIONS

The present study evaluated the association of multiple factors with puerperal sepsis; it was evident that mode of delivery, booking status, and income level were the most significant variables. Because the mothers from lower socioeconomic backgrounds had a much greater rate of puerperal sepsis, and it's unaffordable for socioeconomically challenged mothers to keep regularly visiting for fetal wellbeing assessment, therefore, provision of accessible antenatal care clinics for poor women is encouraged, which may further minimize the number of un-booked cases too. It will be highly effective to increase the number of experienced delivery attendants, ensure aseptic hospital delivery, and maintain good hygiene following birth, which may reduce the incidence of puerperal sepsis.

Authors' Contribution

Conceptualization: SK
Methodology: SK, SB, RS, SN
Formal analysis: RS, SN, MPS
Writing and Drafting: SK, SB, RS, SHA
Review and Editing: SK, SB, RS, SN, SHA, MPS

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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