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PREVALENCE AND RISK FACTORS ASSOCIATED WITH POSTOPERATIVE COMPLICATIONS FOLLOWING CAESAREAN SECTIONS AT SECONDARY HEALTHCARE SYSTEM IN PUNJAB

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Abstract

Introduction and Objectives: *A raise in the demand of Caesarean section procedures in Pakistan specially in Punjab region has raised significant concern because of its complications effecting maternal health. This study was aimed to check the prevalence of this procedure, and identify the potential risk factors and its association in raising the post-operative complications in a secondary healthcare setup.*

Material and Methodology: *A total of 210 women undergoing caesarean section procedures were included in observational cohort study conducted at District Headquarter Hospital Muzaffargarh during July2024-December 2024. Data was collected through a questionnaire developed addressing study objectives related questions including prevalence of C-section, medical history, Reason of procedure, intraoperative and post operative complications, and follow up. Data obtained was entered categorically and statistically analysed using SPSS26.*

Results: *Among 210 women undergoing procedure, 191(91%) of women underwent emergency caesarean section followed by elective caesarean section 19(9%). Haemorrhage 63(30%) was most commonly observed followed by infections 26(12.3%) and post-partum severe pain among 23(10.9%) patients only. Haemorrhage was observed in hypertensive women while infections were observed mostly in diabetic women. Severe pain was mostly reported in the women who had any previous clinical conditions requiring emergency surgery.*

Conclusion: *A significant prevalence of post-caesarean section complications, and identification and management of associated risk factors like diabetes, hypertension, history of previous C-section and mode of*

anaesthesia not only provide with opportunity to overcome these issues but also emphasizes to confine this procedure to medical indications only.

INTRODUCTION

World population is increasing day by day with 132 million births being reported around the globe by the end of 2024 [1] . Some of these babies are delivered through a normal procedure while others women underwent a major surgical procedure in which abdomen is cut open and myometrium is incised to fetch the baby out of placenta called Caesarean section. This procedure was developed as a safe delivery alternate to the women who were unable to gave birth through normal birth canal route because of certain complications. Several techniques like e Joel-Cohen, Misgav-Ladach and Pelosi-type have been developed so far to carry out this procedure with certain modifications and utilized according to the risk and clinical condition encountered [2,3].

There are several factors which can urge an obstetrician to choose a Caesarean section procedure over normal vaginal delivery it can be either maternal or foetus oriented in nature. For instance, in case of mother severe medical conditions like hypertension, diabetes, weak uterus, incomplete contractions or vaginal bleeding can lead towards an emergency C-section procedure to avoid mother or child loss. Similarly fetal abnormal development, macrosomia and fetal distress can potentially affect the newborn requiring urgent surgery to avoid morbidity and mortality before hand [4–6] However, from past several years demand of C-section procedure has been increased without any medical indication because of many reasons ranging from psychological perception like fear of labour pain, birth canal injury and child death fear to health and life safety concerns such as 50% less neonatal deaths chances and protection against perineal ulceration in comparison to vaginal delivery [7–10] . The trend of C-section deliveries has been increased drastically since its discovery from past ten years from 5% to 30-32%. In United states only, one of every third women undergoes this procedure for delivery while in other countries it is observed to be used by every fourth women out of five [11,12] . Like many other countries around the globe, the trend of caesarean section has been also increased in Pakistan as 17.75% of all deliveries in urban areas and 8.05% of all deliveries in less developed rural areas are being done through this procedure collectively contributing to figure much larger than the safe thresh hold of 13-15% suggested by World Health Organization above which it has no potential benefits [13,14] . This rising trend of Caesarean section delivery has raised many concerns because of its potential maternal and perinatal outcomes apart from its cost issues and uneven ability to the rich and poor class. As many complications have been observed during this procedure and postpartum like haemorrhage, thromboembolism, infection and post-partum severe pain which not only effect the mother health but also prolong the mother and child stay in the hospital and may lead to maternal death in severe consequences [15,16] . Several studies from around the globe including UK have raised the concern over this issue where maternal death rate was observed to be three times more with this procedure in comparison to normal vaginal delivery [17,18] . It has been also observed that several risk factors like obesity, diabetes, history of previous C-section and number of deliveries contribute to the origin or even exacerbate these complications. As obesity and diabetes has been observed to affect the body immune system delaying wound healing and increases the chances of infections [19–21] . While, previous C-section procedure scars with multiple deliveries weakens the uterus making it prone to severe haemorrhage during procedure. Screening of these risk factors before hand can contribute towards the management and prevention of these procedure associated complications considerably [22,23]

Punjab is one of largest province by population of Pakistan, its birth rate and mode of deliveries data can provide a considerable summary of the country mother and child health status. A survey carried out to trace birth rate and mode of deliveries in 2017-2018 reported that among 150000 deliveries during this duration 28.9% were through the caesarean section procedure which is a lot more than suggested by WHO emphasizing the need to investigate the effects of overuse of this procedure and potential risk

factors which may give rise to procedure associated complications affecting mother and child health [24]. This study was aimed to investigate the reason of the rising incidence of the c-sections along with its complications and risk factors contributing to these complications and its prevalence in Punjab population.

Material and Methodology

This observational cohort study was carried out in the Department of Surgery, District Headquarter Hospital Muzaffargarh over a period of six months. All the women undergoing C-section surgery during this duration were approached, and informed consent was taken for their voluntary involvement in this study. A total of 210 women undergoing C-section procedure gave their consent to be a part of this study. Women of variable age were involved randomly in study to obtained unbiased results and were divided into age groups as 18-25year, 26-33 year, 34-41year and 42-49year. A questionnaire was developed and used to collect data from the women undergoing c-section either through emergency or planned procedure. It included data from patients' basic demographics like age, name, medical history like any previous C-section, number of deliveries, clinical conditions from the date of conception like Obesity, Diabetes, hypertension to the discharge from hospital like any complication during delivery to postpartum. Incidence of complications was accessed intraoperatively, post partum and after discharge to check for any episode of complication. The prevalence of well documented risk factors like obesity, diabetes, hypertension, eclampsia or preeclampsia and history of previous C-section was also observed among the patients who experienced any complication in order to access the correlation between complication and any risk factor which might be contributing to this underlying condition. Data obtained was coded categorically and statistical analysis was carried out using SPSS 26.

Results

A total of 210 women were included in this study among which 191 underwent emergency Caesarean section followed by elective C-section as shown in Fig 1. Among the patient who underwent emergency C-section procedure various medical condition leading to this decision were observed as shown in Table 1. Women who underwent C-section procedure were predominantly underlying age group of 26-33year with a prevalence rate of 106 followed by 78 among 18-25. While 23 of the women were underlying in the age group of 34-41year age group followed by 3 underlying between 42-49year age group.

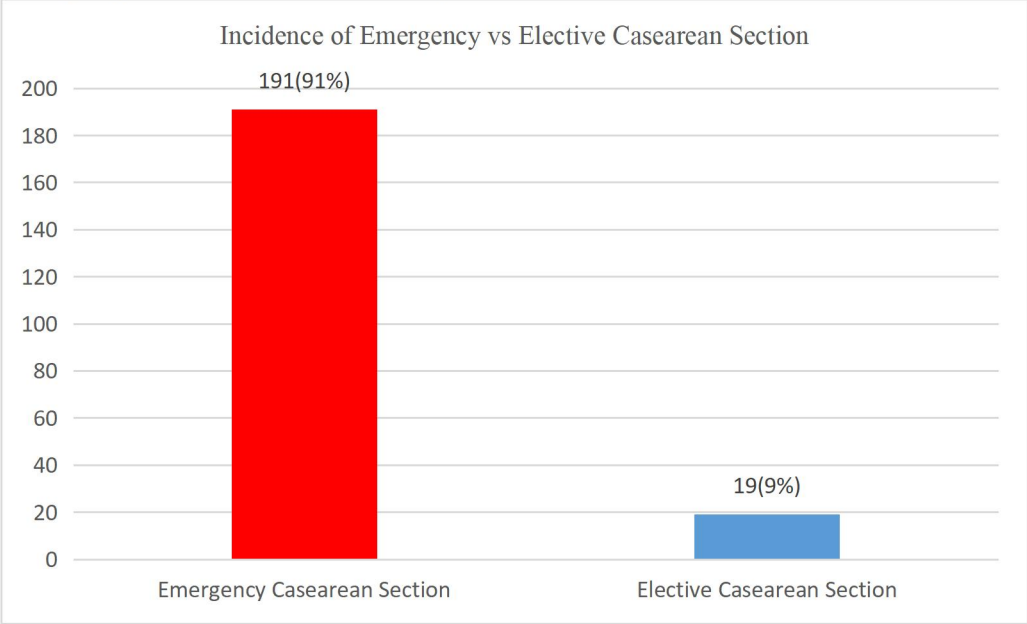

Fig 1 Incidence of Emergency vs Elective Caesarean Section

Table 1 Reasons for Caesarean Section Procedure

	Reasons	No of Cases
Emergency Reason	Anaemic Patient with reduced Liquor	1
	Vaginal Bleeding and Breech Position	4
	Bleeding and Hypertension	4
	Baby breech	11
	Baby breech and Liquor with Grade 3	4
	Breech position and Placenta previa	3
	Breech position and Hypertension	3
	Breech position and Labor pain	4
	Bulky Post gravid uterus	4
	Eclampsia and Vaginal Discharge	2
	Fluid Discharge	4
	Hypertension	20
	Labour Pain	7
	Labour Pain and Vaginal Bleeding	3
	Labour Pain and Liquor Reduced	8
	Liquor Absent	10
	Liquor Reduction with Vaginal Bleeding	64
	Placental Abruption	20
	Placental Issues	7
	Planned C-section with anaemic condition	5
	Previous C-section History	1
	Severe preeclampsia	1
	Vaginal Bleeding	2
Elective	By choice C-section	19

Similarly weight of patient was noted to check for obesity a well-known risk factor for complication during c-section and majority of women 168 had weight underlying between 50-60kg, followed by 20 had weight between 60-70kg and 6 women had weight between 70-80kg. 16 women were underweight underlying between 40-50kg. No case of obesity was observed. Maximum gestational age observed at the time of procedure was 39 weeks observed in 24 cases while minimum gestational age was 33 weeks observed in 5 cases with the history of hypertension requiring urgent c-section. Most of women (134) underwent procedure at the gestational age of 36 weeks. It was observed that all the women had delivered before 40 weeks. While accessing medical history before procedure it was observed that among 210 women, 167 had a history of previous pregnancy while 118 women had undergone C-section procedure in their past for child delivery with maximum number of 4 procedures was observed in a woman as shown Fig 2.

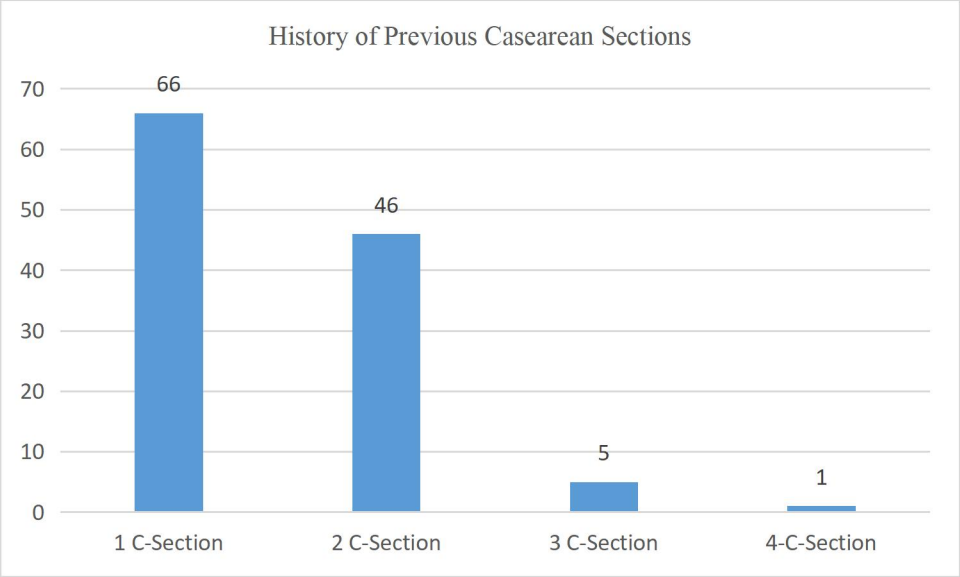

Fig 2 History of Previous Caesarean Section

Also, it was noted only 9(4.2%) patients had a history of diabetes with 3(1.4%) having a history of gestational diabetes while 201(95.7%) pregnant women were healthy as shown in Fig 3

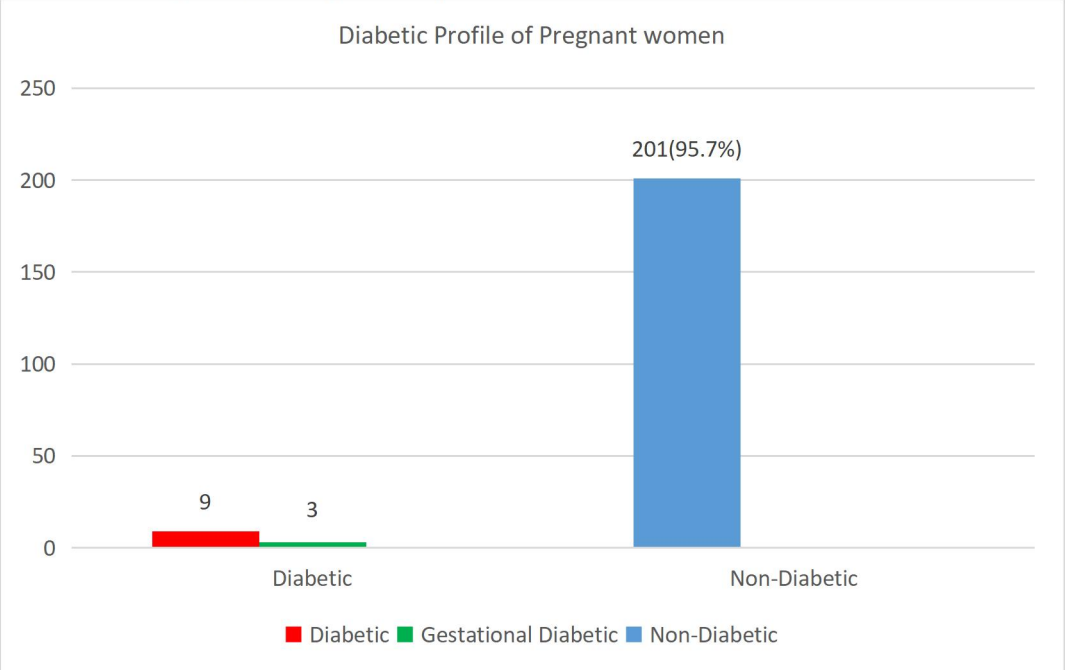

Fig 3 Incidence of Women with Diabetes in Percentage

While taking medical history it was also observed that about 31(14.76%) of women had hypertension history among which 3 women presented with preeclampsia at the time of delivery and while 179 (85.2%) claimed to never faced an episode of high blood pressure as shown in Fig 4.

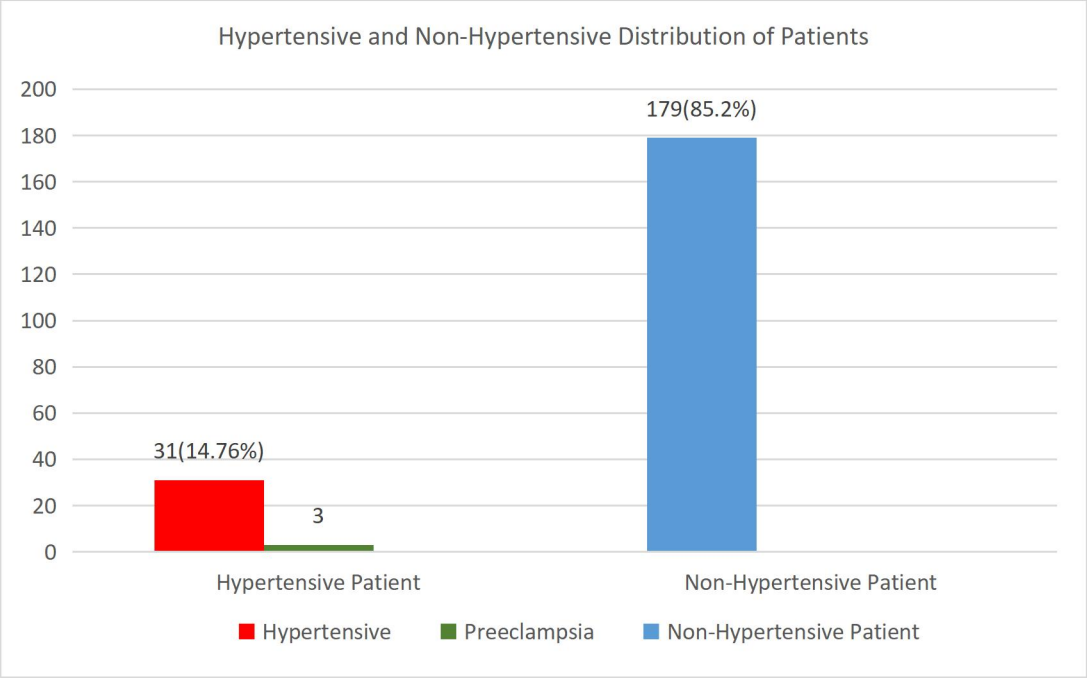

Fig 4 Pictorial Analysis of Hypertension Incidence in the Pregnant Women

All the patients were given prophylactic antibiotic and spinal anaesthesia was administered for surgery. No intraoperative complication was observed except longer duration of procedure in some cases. All the patients were provided with the post partum care and were able to move after 12 hours of surgery. Post partum haemorrhage was most commonly observed complication observed among 63(30%) patients followed by infections 26(12.3%). A severe post partum pain following procedure was observed in 23(10.9%) patients as shown in Table 2.

Table 2 Incidence of Caesarean Section Associated Complication

Complications	**Incidence N** (%)
Post Partum-Haemorrhage	63 (30%)
Infections	26 (12.3%)
Post Partum Severe Pain	23 (10.9%)

Various surgical site infections were observed. Some of them were deep enough to cause systematic outcomes like fever, lethargy as seen in septic wound as shown in Fig 5. Ten of these patients required surgical intervention like resuturing of wounds in case of Septic wounds

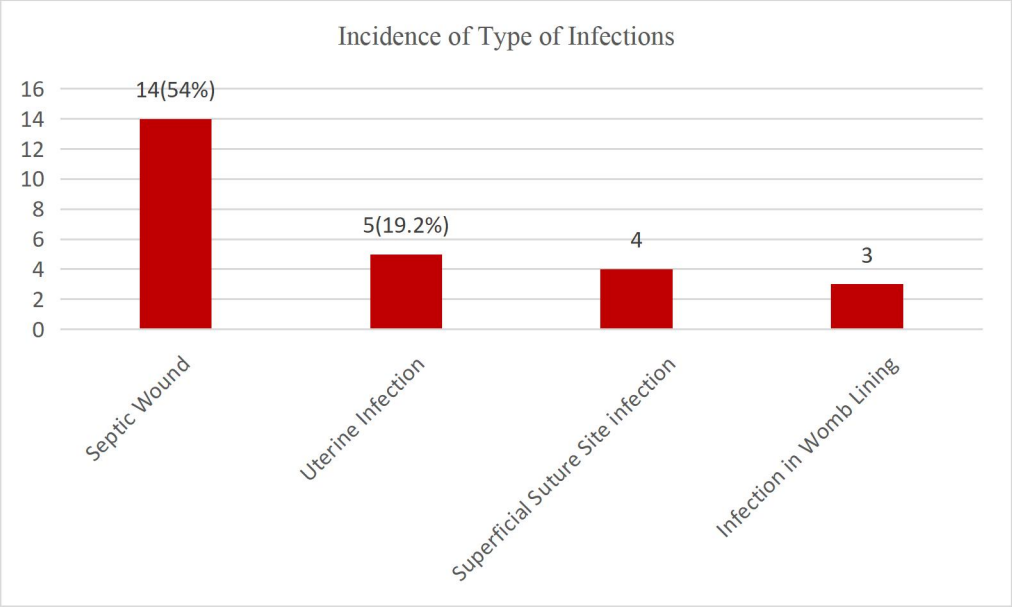

Fig 5 Incidence of Various Types of Infections Observed Post Surgery

Postpartum Severe Pain was observed in 23 women; however, the incidence of pain and site was different in women as shown in Fig 6.

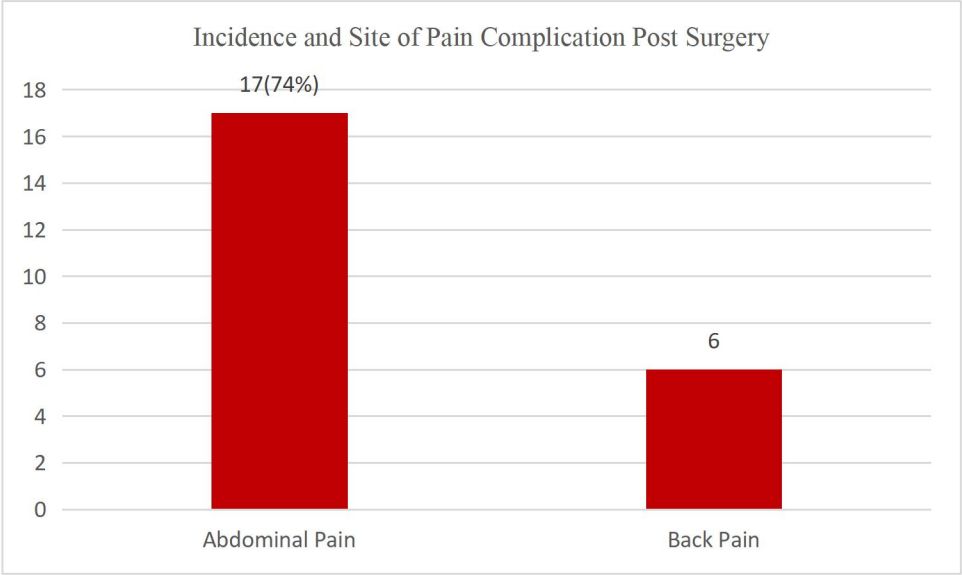

Fig 6 Incidence of Pain in Different Sites Post Surgery

Pearson correlation analysis to check the risk factor association with observed complications revealed a strong correlation value of 0.8 which was close to one between the incidence of emergency c-section and history of previous pregnancies. Positive correlation of 0.9 value was found between reason or clinical conditions requiring emergency C-section and a history of previous C-section.

A higher positive correlation value of 0.89 was obtained between the risk factor diabetes as independent and surgical site infections complication as dependent variable in all patients. Also, it was observed during study that all the patients facing septic wound had strong history of diabetes.

While studying association of hypertension with complication, a value of 0.65 was obtained between

haemorrhage and hypertension suggesting that hypertension may trigger the post partum haemorrhage in women. However, the data for pre-eclampsia was rare and was found with vaginal bleeding and haemorrhage. Severe abdominal pain was observed in patients undergoing emergency C-section in comparison to elective caesarean section.

DISCUSSION

Caesarean section procedure is as one of the most common surgeries preformed worldwide. It is considered as golden standard life saving alternative procedure for women who cannot undergo normal vaginal delivery deliver due to any underlying medical condition which may lead to either mother or child death. This method is now being widely used without any medical indication too considering its safety, painless mode of delivery, and rising fear of vaginal delivery associated fatalities in women. Less knowledge regarding the post-complications is also another misleading factor urging women to opt this method of delivery [25]. However, in Lahore the rate of elective c-section procedure is relatively low in comparison to emergency procedure as in our study (191) 91% of Caesarean section procedures were performed on emergency basis requiring urgent delivery while only (19)9% were performed on the choice of patients. This trend was also observed in a hospital setting of another region of Pakistan name Quetta where 81.05% of C-section deliveries were carried out on emergency basis because of medical condition requiring immediate delivery while less than 36% of women had undergone planned surgery by choice without any medical condition [26] . A similar high incidence rate of emergency C-section in comparison to elective C-section is also observed in a study of neighbouring country India where 79 women had emergency C-section while only it was chosen by only 23 women as mode of delivery by choice [27]. The age of women who underwent this procedure was between 18 to 49 years with maximum number of women underlying among 26-33year age group which was aligned with the findings of a study where incidence rate of women undergoing C-section procedure was two-fold high among those having age more than 25 years [28]. It was also observed that all the women underwent procedure and delivered babies before the 40 weeks of gestational age. A strong relation was observed between the women undergoing emergency c-section and history of multiple pregnancies and previous C-sections. Same results were seen in Brazilian research conducted over 2441 women where a history of previous C-section and multiple pregnancies significantly contributed toward the present emergency c-section delivery in less than 40 weeks of gestational age [29] . These findings were also in aligned with audit results of 7-year survey conducted in England and Whales to evaluate the indications for C-section deliveries [30].

Many complications observed in our study like post-partum haemorrhage among 63(30%) mothers and infections among 26(12.3%) and post-partum severe pain in 23(10.6%) women were also reported as the common maternal complications post caesareans sections procedure in another meta-analysis containing data from more than eight observations [31]. Another study also reported similar prevalence of these complications in women undergoing C-section [32]. Another striking finding was the origin of haemorrhage complication among hypertensive patients and those with the history of previous C-section indication a strong positive correlation as observed by a study where 27% of post-partum haemorrhage was reported in patients who had a history of hypertension while another study also reported the haemorrhage cases in women who underwent second C-section because of adhesions present from previous surgery Hypertension [33,34]. Variable nature and intensity of infection observed in our case was commonly prevalent in diabetic patients, in fact the patients with septic wounds complication had gestational diabetes requiring third generation of antibiotic treatment. Diabetes has been well known to cause defective changes in immune system making a diabetic patient vulnerable to many life-threatening infections delaying wound healing as observed in many diabetic women undergoing c-section procedure condition [35]. Severe abdominal pain in patients who underwent emergency c-section in comparison to elective C-section in our study might be because of uterine perforation as a study reported acute abdominal pain in post-partum in emergency C-section patients because of uterine perforation, also contraction induced during healing leading to scar formation may also contribute to

abdominal pain [36,37] . While back pain in our observation could be due to spinal anaesthesia administrated to relieve pain during surgery suggesting the association of pain with anaesthesia administration route this similar finding was evident in a review study where spinal anaesthesia contributed to the back pain in 90% of patient undergoing surgery [38].

Conclusion:

The findings of this study suggest a significant prevalence of complications like haemorrhage, infections and pain post caesarean section thus emphasizing to limit the use of this procedure to medical indications only. Risk factors like diabetes, hypertension, history of previous C-section and multiple pregnancies can play a pivotal role in origin of these complications. Understanding the prevalence of risk factors in a society and its association with complications can provide an opportunity to mitigate these complications by controlling these factors.

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Our study was approved by the Ethical Board of Academic and Research Unit, the Superior University Lahore.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contribution:

A. H: (Investigation) acquisition of data, (Writing – Original Draft) Drafting the manuscript

H. J: (Conceptualization) Conception and design of study, (Formal analysis) analysis and/or interpretation of data,

M.A.N (Formal analysis) analysis and/or interpretation of data

M.A.U.R (Writing - Review & Editing) revising the manuscript critically for important intellectual content.

REFERENCES

[1] How many people die and how many are born each year? - Our World in Data n.d. https://ourworldindata.org/births-and-deaths (accessed January 25, 2025).

[2] Hofmeyr JG, Novikova N, Mathai M, Shah A. Techniques for cesarean section. Am J Obstet Gynecol 2009;201:431–44.

[3] Negrini R, da Silva Ferreira RD, Guimarães DZ. Value-based care in obstetrics: comparison between vaginal birth and caesarean section. BMC Pregnancy Childbirth 2021;21:333.

[4] Mahapatra P. Rising Cesarean Sections: Causes & Concerns. Towards a Public Health Agenda for Quality & Safety of Maternity Services. A White Paper. n.d.

[5] Mostafayi M, Imani B. Cesarean Section: Risk Factors Threatening the Health of the Mother, the Fetus and Newborn: A Grounded Theory Study 2021.

[6] Guan P, Tang F, Sun G, Ren W. Prediction of emergency cesarean section by measurable maternal and fetal characteristics. Journal of Investigative Medicine 2020;68:799–806.

[7] Wax JR. Maternal request cesarean versus planned spontaneous vaginal delivery: maternal morbidity and short term outcomes. Semin Perinatol, vol. 30, Elsevier; 2006, p. 247–52.

[8]J enabi E, Khazaei S, Bashirian S, Aghababaei S, Matinnia N. Reasons for elective cesarean section on maternal request: a systematic

review. The Journal of Maternal-Fetal & Neonatal Medicine 2020;33:3867–72.
[9] Collard TD, Diallo H, Habinsky A, Hentschell C, Vezeau TM. Elective cesarean section: Why women choose it and what nurses need to know. Nurs Womens Health 2008;12:480–8.
[10] Villar J, Valladares E, Wojdyla D, Zavaleta N, Carroli G, Velazco A, et al. Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. The Lancet 2006;367:1819–29.
[11] Antoine C, Young BK. Cesarean section one hundred years 1920–2020: the Good, the Bad and the Ugly. J Perinat Med 2021;49:5–16.
[12] Sohail M, Khurshid M, Saleem HGM, Javed H, Khan AA. Characteristics and antibiotic resistance of urinary tract pathogens isolated from Punjab, Pakistan. Jundishapur J Microbiol 2015;8:e19272.
[13] Yaya S, Uthman OA, Amouzou A, Bishwajit G. Disparities in caesarean section prevalence and determinants across sub-Saharan Africa countries. Glob Health Res Policy 2018;3:1–9.
[14] Mumtaz S, Bahk J, Khang Y-H. Rising trends and inequalities in cesarean section rates in Pakistan: Evidence from Pakistan Demographic and Health Surveys, 1990-2013. PLoS One 2017;12:e0186563.
[15] Boerma T, Ronsmans C, Melesse DY, Barros AJD, Barros FC, Juan L. Optimising caesarean section use 1 Global epidemiology of use of and disparities in caesarean sections. Lancet 2018;392:1341–8.
[16] Mylonas I, Friese K. Indications for and risks of elective cesarean section. Dtsch Arztebl Int 2015;112:489.
[17] Dosa L. Caesarean section delivery, an increasingly popular option. Bull World Health Organ 2001;79:1173.
[18] Ahsan A, Khan AZ, Javed H, Mirza S, Chaudhary SU, Shahzad-ul-Hussan S. Estimation of hepatitis C prevalence in the Punjab province of Pakistan: A retrospective study on general population. PLoS One 2019;14:e0214435.
[19] de Paiva LV, Nomura RMY, Dias MCG, Zugaib M. Maternal obesity in high-risk pregnancies and postpartum infectious complications. Revista Da Associação Médica Brasileira (English Edition) 2012;58:453–8.
[20] Fernández Alba JJ, Paublete Herrera C, Vilar Sanchez A, Gonzalez-Macias C, Castillo Lara M, Torrejón R, et al. Indications of caesarean section in overweight and obese versus normal-weight pregnant women: a retrospective cohort study. The Journal of Maternal-Fetal & Neonatal Medicine 2018;31:357–63.
[21] Chiu H-Y, Chen H-H, Wang C-W, Lu H, Wu C-H, Yang C-C, et al. The risks of emergency C-section, infant health conditions and postpartum complications in Taiwanese primiparous women with gestational diabetes mellitus: A propensity matched cohort study. Taiwan J Obstet Gynecol 2024;63:880–6.
[22] Mbah AK, Sharma PP, Alio AP, Fombo DW, Bruder K, Salihu HM. Previous cesarean section, gestational age at first delivery and subsequent risk of pre-eclampsia in obese mothers. Arch Gynecol Obstet 2012;285:1375–81.
[23] Doret M, Touzet S, Bourdy S, Gaucherand P. Vaginal birth after two previous c-sections: obstetricians–gynaecologists opinions and practice patterns. The Journal of Maternal-Fetal & Neonatal Medicine 2010;23:1487–92.
[24] Zeeshan M, Iqbal A, Rasul S, Shahzad I, Ashraf S, Akbar A. Prevalence and Associated Factors of Caesarean Section in Punjab, Pakistan: Evidence from Multiple Indicators Cluster Survey,(2017-2018) Punjab. Pak J Med Res 2021;60:62–8.
[25] Todman D. A history of caesarean section: from ancient world to the modern era. Australian and New Zealand Journal of Obstetrics and Gynaecology 2007;47:357–61.

[26] Taj N, Jan F, Taj G, Anwar F, Mengal MH, Taj S. Study to Determine the Indications and Frequency of Elective and Emergency Caesarean Section in A Tertiary Care Hospital. Medical Forum Monthly, vol. 32, 2021.

[27] Srilakshmi A V. PREVALENCE AND CAUSES FOR ELECTIVE AND EMERGENCY CAESAREAN SECTION DELIVERY AMONG PREGNANT WOMEN: A PROSPECTIVE HOSPITAL BASED STUDY. Int J Acad Med Pharm 2024;6:75–8.

[28] Muhammad T, Srivastava S, Kumar P, Rashmi R. Prevalence and predictors of elective and emergency caesarean delivery among reproductive-aged women in Bangladesh: evidence from demographic and health survey, 2017–18. BMC Pregnancy Childbirth 2022;22:512.

[29] Osava RH, Silva FMB da, Tuesta EF, Oliveira SMJV de, Amaral MCE do. Cesarean sections in a birth center. Rev Saude Publica 2011;45:1036–43.

[30] Choudhury AP, Dawson AJ. Trends in indications for caesarean sections over 7 years in a Welsh district general hospital. J Obstet Gynaecol (Lahore) 2009;29:714–7.

[31] Mascarello KC, Horta BL, Silveira MF. Maternal complications and cesarean section without indication: systematic review and meta-analysis. Rev Saude Publica 2017;51:105.

[32] Pallasmaa N. Cesarean section-short term maternal complications related to the mode of delivery 2014.

[33] Ruiz MT, Azevedo CT, Ferreira MBG, Mamede MV. Association between hypertensive disorders and postpartum hemorrhage. Rev Gaucha Enferm 2015;36:55–61.

[34] Saban A, Shoham-Vardi I, Yohay D, Weintraub AY. Peritoneal adhesions during cesarean delivery are an independent risk factor for peri-partum hemorrhagic complications. European Journal of Obstetrics & Gynecology and Reproductive Biology 2020;251:188–93.

[35] Moghaddam FR, Razavi M, Delaramifar Z. Prevalence and Risk Factors of Surgical Site Infection Following Cesarean Section. Journal of Kermanshah University of Medical Sciences n.d.;29.

[36] Waseem M, Cunningham-Deshong H, Gernsheimer J. Abdominal pain in a postpartum patient. J Emerg Med 2011;41:261–4.

[37] Aliem RS, Ramadan E. Effect of Intervention Guidelines on Enhanced Postpartum Recovery after Cesarean Section. International Journal of Nursing Didactics 2018;8:77–89.

[38] Shanthi SPM. Prevalence of back-pain following caesarean section under spinal anesthesia. Int J Reprod Contracept Obstet Gynecol 2023;12:2877.