International Journal of Community Medicine and Public Health
Singh S et al. Int J Community Med Public Health. 2021 Sep;8(9):4404-4410
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20213544

Original Research Article

A cross-sectional study on factors influencing caesarean section rates in a tertiary care hospital, Jhansi (Uttar Pradesh)

Swati Singh[1]*, Anil Kumar Malhotra[2]

[1]Department of Community Medicine, Government Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India
[2]Department of Community Medicine, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, India

Received: 13 July 2021
Accepted: 18 August 2021

***Correspondence:**
Dr. Swati Singh,
E-mail: swati.singh678@gmail.com

ABSTRACT

Background: Worldwide rise in caesarean delivery (CD) rates during the last three decades has been a cause of alarm. The rates of such delivery have increased dramatically in recent years from 12% in 1990 to 24% in 2008. Tertiary care centers have high caesarean section rates but areas where health care facilities are not available may have maternal deaths due to lack of C-section facilities. The present study was conducted to determine the prevalence of caesarean section, to assess the association between caesarean section with socio-demographic determinants and maternal risk factors.
Methods: Cross-sectional study was conducted during January 2016 to April 2016. A total of 288 pregnant females admitted in obstetric ward of medical college Jhansi formed the study population, a simple random sampling technique was adopted for the study. A study tool was pre-designed and pre-tested interview schedule. The data collected was entered in MS excel and analyzed using SPSS 24 version.
Results: The study showed that 73 (25.34%) of our study participants have delivered by caesarean section. Caesarean section was significantly associated with literacy, place of residence, education status, socio-economic status and occupation of the husband. Caesarean section was significantly associated with maternal risk factors like obesity, pregnancy induced hypertension, gestational diabetes mellitus and polyhydromnios.
Conclusions: Present study found a high caesarean section rate as compared to the WHO standard. Utilization of antenatal care, better doctor patient communication, doctor's commitment to reduce the rate of LSCS, may help to reduce the increasing rate of caesarean delivery.

Keywords: Caesarean section, Pregnancy induced hypertension, Gestational diabetes, Polyhydromnios

INTRODUCTION

Worldwide rise in CD rates during the last three decades has been a cause of alarm.[1] The rates of such delivery have increased dramatically in recent years from 12% in 1990 to 24% in 2008 with no improvement in outcome for neonates.[2]

Rise in incidence of caesarean sections (CSs) could be due to increased safety of the operation due to improved anaesthesia, availability of blood transfusion and antibiotics, other responsible factors such as rising incidence of primary caesarean section, decline in operative vaginal delivery and identification of high risk pregnancy.[3]

The guidelines published in 1997 by UNICEF, WHO and UNFPA states that proportion of caesarean births should range between 5 to 15%. The rate of CSs below 5% seems to be associated with gaps in obstetric care leading to poor health outcomes for mothers and child, whereas

rates over 15% don't seem to improve either maternal or infant health.[4,5]

In India the rural-urban difference between lower section caesarean section (LSCS) rates is quite conspicuous. The rate of LSCS is higher in urban areas than their rural counterparts for all the states.[6] The higher urban rates may be a reflection of combination of factors like higher availability and utilization of maternal health care services, larger concentration of private health institutions in the cities and towns. Moreover, the demographic and socioeconomic backgrounds of the persons living in the rural and urban places affect the CS rate to a great extent.[7]

Tertiary care centers have high CS rates but areas where health care facilities were not available may have maternal deaths due to lack of CS facilities.[8] It would therefore be helpful to assess CS rates in tertiary health care facilities which could be in some way be representative of CS rates of the population catered by that centre. Therefore, present study was conducted to determine the prevalence of caesarean section, to assess the association between caesarean section with socio-demographic determinants and maternal risk factors.

METHODS

This was a hospital based cross sectional study. The study was conducted under the department of community medicine, Maharani Laxmi Bai medical college, Jhansi, a tertiary care hospital. The study was conducted on the pregnant female, belonging to reproductive age group (15-44 years) admitted in department of gynecology and obstetrics. Study was carried out from January 2016 to April 2016. A cesarean delivery is a surgical procedure in which a fetus was delivered through an incision in the mother's abdomen and uterus.[9]

This study was conducted to find out the prevalence of CS among pregnant females depending upon their age group, education strata, rural or urban background, occupation, socio-economic status. Socioeconomic status was assessed using the modified B. G. Prasad classification. The study was conducted on 288 pregnant females admitted under department of obstetrics. The females were selected using simple random sampling technique. Data was collected from the mothers on predesigned and pretested semi-structured questionnaire. Consent was taken from the mothers prior to study.

Inclusion criteria

Females in reproductive age group 15-44 years of age, those who gave informed consent were included in the study. Singleton pregnancy were included.

Exclusion criteria

Females who have taken treatment for infertility were excluded from the study. Females who did not know their last menstrual period or who did not had ultrasound in 1st trimester were excluded from the study.

Sample size in the present study was calculated statistically on the basis of prevalence of CS was found to be 17% in India.[10]

The sample size was calculated using the formula,[11]

$n=\frac{4pq}{L^2}$,

where,

n=sample size,

p=proportion in the population processing the characteristic of interest,

L=absolute error,

q=(1-p).

Considering 95% confidence interval, prevalence and taking L, absolute error in the estimate of p as 5%, the sample size was calculated to be 217. Taking the non-response rate of 20%, a total of 288 pregnant females were selected for the study.

Statistical analysis

The collected data was entered in MS excel and analysed in SPSS version 24. Chi-square test was used for comparison and statistical significance was taken at $p<0.05$. Logistic regression was used to study the association between caesarean section rates with sociodemographic variables and risk factors for CDs.

RESULTS

In our study, majority of the mothers are in the age group of 15-24 years (49.65%). Most of study participant were Hindus (87.50%) in religion, belonging to general caste (61.46%), followed by OBC (25.69%). 52.08% of the study participants were residing in rural area. Majority of our study participants were literate (67.01%). 67.01% of females were living in nuclear family. Most of our study participants belong to IV and III socio-economic status 48.61% and 32.29% respectively. Most of the study participant's husband were semi-skilled or unskilled worker. Most of our study participants were housewives (94.79%). Of the total 73 (25.34%) of our study participants have delivered by caesarean section.

Table 1 is showing the association of CS with various sociodemographic determinants. Caesarean section was not statistically associated with the age group of the participants, religion and caste; but was more prevalent in OBC females compared to general and SC/ST females. Caesarean section was more prevalent in females living in

urban area and it was significantly associated with p<0.001. CS was not significantly associated with type of family. Prevalence of CS was more in literate females and it was statistically significantly associated with p=0.019. Caesarean section was more prevalent in females of socioeconomic status I followed by II and it was statistically significantly associated with socioeconomic status with p=0.026. CS was not significantly associated with working status of female. Wives of professional and semi-professionals workers had higher prevalence of delivery by CS and it was statistically significantly associated with p=0.003.

Table 2 presents the crude OR defining the association between various sociodemographic indicators with caesarean section. The odd of having caesarean section was highest in age group 15-24 years, but it was not statistically associated. The odd of having caesarean section in Hindus and Muslims females was almost equal. The odd of CS was highest in OBC category female and was statistically significantly associated with odd ratio 3.07 (CI 1.063-8.874) and p=0.038. Rural residence have less chance of delivering by caesarean section, odd ratio 0.293 (CI 0.166-0.518). Odd of caesarean section was almost equal in female living in both joint and nuclear family. Chances of having caesarean section was double in literate females as compared with illiterate females, odd ratio 2.069 (CI 1.113-3.847). With increasing socioeconomic status, odds of having CS increased; except between socioeconomic status V and IV, where odds of having CS was less in socioeconomic status IV. The odd of having CS was more in the wives of professional, semi-professional clerical and skilled worker than wives of semi-skilled and unskilled worker, it was statistically significantly associated.

Table 1: Association of CS with socio-demographic characteristics.

Demographic factors	Caesarean section	Normal vaginal delivery	Chi-square	P value	df
Age distribution (age in years)					
15-24	32 (22.4)	111 (77.6)	2.65	0.26	2
25-34	37 (27.2)	99 (72.8)			
>35	4 (44.4)	5 (55.6)			
Religion					
Hindu	64 (25.4)	188 (74.6)	0.003	0.959	1
Muslim	9 (25.0)	27 (75.0)			
Caste					
General	44 (24.9)	133 (75.1)	4.72	0.094	2
OBC	24 (32.4)	50 (67.6)			
SC/ST	5 (13.5)	32 (86.5)			
Place of residence					
Rural	22 (14.7)	128 (85.3)	18.87	0.000	1
Urban	51 (37.0)	87 (63)			
Family type					
Joint	26 (27.4)	69 (72.6)	0.306	0.580	1
Nuclear	47 (24.4)	146 (75.6)			
Literacy status					
Literate	57 (29.5)	136 (70.5)	5.42	0.019	1
Illiterate	16 (16.8)	79 (83.2)			
Occupation					
Working	5 (33.3)	10 (66.7)	0.533	0.465	1
Housewife	68 (24.9)	205 (75.1)			
Occupation of husband					
Professional/semi-professional	5 (62.5)	3 (37.5)	11.39	0.003	2
Clerical/skilled	40 (30.8)	90 (69.2)			
Semi-skilled/unskilled	28 (18.7)	122 (81.3)			
Socio-economic status					
I	5 (71.4)	2 (28.6)	11.07	0.026	4
II	5 (38.5)	8 (61.5)			
III	26 (28.0)	67 (72.0)			
IV	29 (20.7)	111 (79.3)			
V	8 (22.9)	27 (77.1)			

Table 2: Univariate analysis between CS and socio-demographic characteristics.

Demographic factors	B	Wald	OR	P value	CI
Age distribution (age in years)					
15-24	1.02	2.125	2.78	0.145	0.704-10.946
25-34	0.76	1.189	2.14	0.276	0.545-8.407
>35	Reference				
Religion					
Hindu	0.02	0.003	1.021	0.959	0.456-2.286
Muslim	Reference				
Caste					
General	0.75	2.152	2.12	0.142	0.777-5.768
OBC	1.12	4.30	3.07	0.038	1.063-8.874
SC/ST	Reference				
Place of residence					
Rural	-1.23	17.84	0.293	0.000	0.166-0.518
Urban	Reference				
Family type					
Joint	0.16	0.306	1.17	0.580	0.670-2.045
Nuclear	Reference				
Education					
Literate	0.72	5.022	2.069	0.021	1.113-3.847
Illiterate	Reference				
Occupation					
Working	0.41	0.527	1.510	0.468	0.498-4.565
Housewife	Reference				
Occupation of husband					
Professional/semi-professional	1.98	6.810	7.262	0.009	1.638-32.193
Clerical/skilled	0.66	5.458	1.937	0.019	1.112-3.371
Semi-skilled/unskilled	Reference				
Socio-economic status					
I	2.13	5.276	8.438	0.022	1.367-52.060
II	0.75	1.144	2.109	0.285	0.537-8.280
III	0.27	0.338	1.310	0.561	0.527-3.253
IV	-0.126	0.077	0.882	0.781	0.363-2.144
V	Reference				

Table 3: Association of CS with maternal risk factors.

Risk factors	CS	Normal vaginal delivery	Chi-square	P value	df
Body mass index					
Normal	25 (15.5)	136 (84.5)			
Pre-obese	40 (34.2)	77 (65.8)	28.82	0.000	2
Obese	8 (80)	2 (20)			
Gravida					
1	28 (30.1)	65 (69.9)			
2	22 (19.1)	93 (80.9)	3.95	0.139	2
≥3	23 (28.8)	57 (71.2)			
Anaemia					
Present	44 (27.5)	116 (72.5)	0.882	0.348	1
Absent	29 (22.7)	99 (77.3)			
Pregnancy induced hypertension					
Present	19 (61.3)	12 (38.7)	23.718	0.000	1
Absent	54 (21.0)	203 (79.0)			

Continued.

Risk factors	CS	Normal vaginal delivery	Chi-square	P value	df
Gestational diabetes mellitus					
Present	17 (73.9)	6 (26.1)	31.157	0.000	1
Absent	56 (21.1)	209 (78.9)			
Polydydromnios					
Present	3 (100)	0 (0.0)	8.929	0.003	1
Absent	70 (24.6)	215 (75.4)			
Preterm					
Present	38 (53.5)	33 (46.5)	39.528	0.000	1
Absent	35 (16.1)	182 (83.9)			

Table 4: Univariate analysis between CS and maternal risk factors.

Risk factors	B	Wald	OR	P value	CI
Body mass index					
Normal	-3.08	14.11	0.046	0.000	0.009-0.229
Pre-obese	-2.041	6.285	0.130	0.012	0.026-0.641
Obese	Reference				
Gravida					
1	0.065	0.038	1.068	0.845	0.554-2.058
2	-0.534	2.432	0.586	0.119	0.300-1.147
≥3	Reference				
Anaemia					
Present	0.258	0.880	1.295	0.348	0.755-2.222
Absent	Reference				
Pregnancy induced hypertension					
Present	1.784	19.960	5.952	0.000	2.722-13.017
Absent	Reference				
Gestational diabetes mellitus					
Present	2.358	22.416	10.574	0.000	3.983-28.071
Absent	Reference				
Preterm					
Present	1.790	35.322	5.988	0.000	3.319-10.804
Absent	Reference				

Table 3 shows the association between CS and various risk factors. CS was significantly associated with body mass index, being most prevalent in obese females. CS was not associated with gravida and presence of anaemia in females. Prevalence of CS was more in females with either of following conditions; pregnancy induced hypertension, preterm birth, gestational diabetes mellitus and polyhydromnios and it was statistically significantly associated.

In Table 4 univariate analysis was done, unadjusted odd ratio were shown. The odds of having CS was highest in obese females, followed by pre-obese than females with normal BMI and it was statistically significantly associated. The odds of having CS was least in females with gravida 2 but was not significantly associated. The chances of having CS was more in females with anaemia, but not significantly associated. Females with pregnancy induced hypertension have 5.9 times more chances of delivering by caesarean section. Females with gestational diabetes mellitus was 10.5 times more chance of having CS. Preterm births have 5.9 times more probability of delivering by caesarean section.

DISCUSSION

Globally there was an ongoing debate on what should be the optimal rates of CS deliveries.[12-15] As per recently published WHO report, *"At population level, CS rates higher than 10% were not associated with reductions in maternal and new-born mortality rates".*[1] In India there is an increasing trend of CS delivery with increase in the institutional deliveries and growing access to gynaecological and obstetric care. As the study was conducted in tertiary care centre the caesarean rate was more when compared to state caesarean rate. In our study 25.34% participants have delivered by CS. Similar findings were seen in a population based cross sectional study by Sreevidya et al found the total population CS rate was 32.6% and primary CS rate was 25%. In a study

by Padmaleela et al observed that nearly 63% of the deliveries conducted were normal deliveries and the remaining were either assisted (5.9%) or CSs (31.15%).[17,18] In a study conducted by Parikh et al prevalence rate of caesarean section was 29.0%.[19]

In our study CS rate was significantly associated with females residing in urban area, literacy status, socioeconomic status and profession of husband. In a study conducted in China by Feng et al there was increase in CS as the level of education and socioeconomic status increased.[20] In a study done by Parikh et al there was significant association of CS with socioeconomic status.[19] More CS births took place in urban woman as compared to the ones who resided in rural areas. More accessibility to medical intervention in urban areas, presence of more health facilities and insurances in urban areas can be probable reasons.[21] Wealthier woman, belonging to higher caste group and having some schooling and more likely to deliver by CS ($p<0.001$). CS seemed to be a choice method for woman who can afford it rather than being a procedure for safe delivery when medically indicated.[22,23] Woman with lower socioeconomic status might cannot afford or do not have access to health facilities which were equipped to perform caesarean delivery. Other studies on CS births in developing countries have also supported this finding.[24]

In our study CS was significantly associated with obesity, pregnancy induced hypertension, gestational diabetes mellitus and preterm births. In a study by Al-Kubaisy et al there was a significant positive association between BMI and the rate of CS. As BMI increased the rate of CS too increased. In other study by Kominarek et al 2010 in US also found that caesarean deliveries increased significantly across the different classes of obesity.[25] Our study showed significant association between CS and pregnancy induced hypertension. In a study by Jacob et al CS was associated with a higher risk of gestational hypertension.[26] Our study showed significant association between gestational diabetes mellitus and CS, similar findings were seen, GDM occured in 1.2 to 14.3 per cent of all pregnancies and was associated with increased risk of important maternal and perinatal complications such as increased risk for caesarean delivery.[27,28]

CONCLUSION

Present study found a high CS rate as compared to the WHO standard. The scheme like Janani Suraksha Yojana (JSY) may have a great impact on accepting institutional deliveries by poor women which may be a reason of the increase of LSCS in India. Utilization of antenatal care, better doctor patient communication, doctor's commitment to reduce the rate of LSCS, may help to reduce the increasing rate of caesarean delivery. Among all other factors, perhaps place of delivery (private or public medical institution) is becoming the strong factor influencing LSCS. Unnecessary caesarean delivery also put strain on family and may complicate maternal and child health. Therefore, the decision to perform a CS delivery must be chosen carefully. Utilization of ANC, better doctor-patient communication, doctor's commitment to reduce the rate of LSCS, government's intention to develop better health care infrastructure and strict vigil on the private health institutions may help to reduce the increasing rate of caesarean delivery.

ACKNOWLEDGEMENTS

The authors express heartfelt gratitude to all the study participants of this research who shared their valuable experiences and spent their precious time.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Mukherjee SN. Rising caesarean section rate. In J Obstet Gynecol. 2006; 4(56):298-300.
2. Lopes T, Spirtos N, Naik R, Monaghan J. Bonney's Gynaecological Surgery. 11th ed. Blackwell Publishing Ltd; 2010.
3. Dutta DC. Textbook of Obstetrics. 8th ed. New Delhi: Jaypee Brothers Publishers; 2015: 669-78.
4. Althabe F, Belizon JM. LSCS: the paradox. Lancet. 2006;368(9546):1472-3.
5. Dongen PV. Caesarean section-etymology and early history. South Afr J Obstet Gynaecol. 2009;15(2).
6. Padmadas SS, Kumar S, Nair SB, Kumari A. Caesarean section delivery in Kerala, India: evidence from a National Family Health Survey. Soc Sci Med. 2000;51(4):511-21.
7. NIH state-of-the-science conference statement on caesarean delivery on maternal request. NIH Consens Sci Statements. 2006;23(1):1-29.
8. Halpern SH, Leighton BL. The risks of lowering the caesarean delivery rate. N Engl J Med. 1999:341(1):54-7.
9. American College of Obstetricians and Gynecologists. (2015). Cesarean birth (C-section). FAQ006. Retrieved June 1, 2016. Available at: https://www.acog.org/womens-health/faqs/cesarean-birth.
10. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai: IIPS. Available at: https://ruralindiaonline.org/en/library/resource/national-family-health-survey-nfhs-4-2015-16-india.
11. Lwanga SK, Lameshow S. Sample size determination in health studies-a practical manual: World Health Organization, 2000. Available at: http://apps.who.int/iris/bitstream/handle/10665/40062/9241544058_(p1-22).pdf
12. WHO. Fact sheet: WHO statement on cesarean section rates, 2015, Available at: http://apps.who.int/iris/bitstream/10665/161442/1/W

HO_RHR_15.02_eng.pdf. Accessed on 28 June 2021.
13. Appropriate technology for birth. Lancet. 1985;2(8452):436-7.
14. Neuman M, Alcock G, Azad K, Kuddus A, Osrin D, More NS, et al. Prevalence and determinants of caesarean section in private and public health facilities in underserved south Asian communities: cross-sectional analysis of data from Bangladesh, India and Nepal. BMJ Open. 2014;4(12):005982.
15. Ronsmans C, DeBrouwere V, Dubourg D, Dieltiens G. Measuring the need for lifesaving obstetric surgery in developing countries. BJOG. 2004;111(10):1027-30.
16. Souza J, Gulmezoglu A, Lumbiganon P, Laopaiboon M, Carroli G, Fawole B, et al. Cesarean section without medical indications is associated with an increased risk of adverse short term maternal outcomes: the 2004-2008 WHO global survey on maternal and perinatal health. BMC Med. 2010;8:71.
17. Sreevidya S, Sathiyasekaran BWC. High caesarean rates in Madras (India): a population-based cross sectional study. Br J Obstet Gynaecol. 2003;110(2):106-11.
18. Padmaleela K, Thomas V, Prasad KV. An analysis of the institutional deliveries and their outcomes in government teaching hospitals of Andhra Pradesh, India. Int J Health Sci Res. 2013;3(5):76-81.
19. Parikh U, Oza PR. Study of rate, trends and determinants of caesarean section among mothers attending a tertiary care center in Ahmedabad, Gujarat, India. Int J Intg Med Sci. 2018;5(2):577-81.
20. Feng XL, Xu L, Guo Y, Ronsmans C. Factors influencing rising caesarean rates in China between 1998 and 2008. Bull World Health Organ. 2012;90(1):30-9.
21. Khanal V, Karkee R, Lee AH, Binns CW. Adverse obstetric symptoms and rural–urban difference in cesarean delivery in Rupandehi district, western Nepal: a COHORT study. Reprod Health. 2016;13:17.
22. Cavallaro FL, Cresswell JA, França GV, Victora CG, Barros AJ, Ronsmans C. Trends in cesarean delivery by country and wealth quintile: cross-sectional surveys in southern Asia and Sub-Saharan Africa. Bull World Health Organ. 2013;91(12):914-22.
23. Ronsmans C, Holtz S, Stanton C. Socioeconomic differentials in caesarean rates in developing countries: a retrospective analysis. Lancet. 2006;368(9546):1516-23.
24. Boatin AA, Schlotheuber A, Betran AP, Moller A, Barros AJD, Boerma T, et al. Within country inequalities in caesarean section rates: observational study of 72 low and middle income countries. BMJ. 2018;360:55.
25. Kominiarek MA, Vanveldhuisen P, Hibbard J, Landy H, Haberman S, Learman L, et al. The maternal body mass index: a strong association with delivery route. Am J Obestet Gyneco 2010;203(3):264.
26. Jacob L, Taskan S, Macharey G, Sechet I, Ziller V, Kostev K. Impact of caesarean section on mode of delivery, pregnancy-induced and pregnancy-associated disorders, and complications in the subsequent pregnancy in Germany. GMS Ger Med Sci. 2016;14:1612-3174.
27. Hanna FW, Peters JR. Screening for gestational diabetes: past, present and future. Diabet Med. 2002;19(5):351-8.
28. American Diabetes Association. Gestational diabetes mellitus. Diabetes Care. 2003;26(1):88-90.

Cite this article as: Singh S, Malhotra AK. A cross-sectional study on factors influencing caesarean section rates in a tertiary care hospital, Jhansi (Uttar Pradesh). Int J Community Med Public Health 2021;8:4404-10.