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Association of sociodemographic factors with multiple births and birth outcomes in comparison to single births among deliveries conducted at a tertiary hospital in Rewa, Madhya Pradesh

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ABSTRACT

Introduction: Multiple gestations are considered as high-risk pregnancy due to associated high maternal morbidity and perinatal mortality in comparison with singleton pregnancies. The present study was conducted to determine the frequency and outcomes of multiple births in comparison to single births and to study association of multiple births with sociodemographic variables. **Methodology:** A retrospective observational study was conducted at Gandhi Memorial Hospital, Rewa, Madhya Pradesh, India. Hospital medical records for the number of deliveries and subsequent details were looked into, for the year 2005. Information was collected on variables such as: sex at birth, birth outcome, and viability of the new-born at birth and birth weight, mode of delivery, residence, educational status, age, occupation and religion of the mother. Statistical analysis was performed using SPSS version 14.0 with all values expressed as percentages or mean and standard deviations. The association of sociodemographic characteristics of the mothers for single deliveries and multiple deliveries were compared using Chi-square test for the categorical variables. The outcome of single and multiple births for various variables were compared using unpaired t-test. A $P \leq 0.05$ was considered to be statistically significant. **Results:** Overall prevalence of 29/1000 births was observed for multiple births out of the total 4170 deliveries for the year 2005. A higher proportion of multiple births (81%) were seen in mothers in the age group 20-29 years. Multiple births were found more at higher birth orders. Proportion of low birth weight (LBW) among multiple births was 29.8% and 19.3% in singleton births. Mean birth-weight was 2638.3 ± 430 g for single births and 2322.4 ± 446.7 g for multiple births. Cesarean mode of delivery was adopted in 14% of multiple births as compared with 11.4% in single births and assisted deliveries 8.3% in multiple births as compared with 3.2% in single births. **Conclusion:** Higher birth order along with young age of mother to be strongly implicated in the higher incidence of multiple births. Perhaps the outcome of multiple births resulted more LBW babies and accounted for the higher incidence of still births, cesarean and assisted deliveries as compared with single births. Timely detection of multiple births and highly equipped public-sector hospitals are the key to preventing complications and improving outcomes in such pregnancies.

Key words: Birth order, birth outcome, multiple births, sociodemographic factors

Introduction

Multiple births are defined as birth of two or more babies in parturition. While multiple pregnancies are a high-risk situation because of its inherent risks to the mother and the fetus, it has been gaining importance worldwide due to the rising incidence attributable to assisted reproductive technologies. Incidence of multiple pregnancies varies worldwide with a reported constant of 34/1000 births in United States [1]. Nigeria has the highest prevalence of multiple births worldwide [2,3]. The crude multiple birth ratio in Indian communities varies from 7-8 to 11-53/1000 births [4] with rate of twinning being estimated at 1% of pregnancies [5-7].

Multiple gestations, in comparison to singleton pregnancies have multiple risk factors that contribute to high maternal and perinatal morbidity ratio; of these risk factors, sociodemographic profile is utmost critical that can reduce the burden of morbidity and subsequently can impact the outcome in the multiple pregnancies. Hence, the present investigation was undertaken to determine the frequency and outcomes of multiple births in comparison to single births at our institute, and to evaluate the association of multiple births with sociodemographic variables.

Methodology

Study protocol and design
A retrospective record-based observational study was conducted at Gandhi Memorial Hospital, affiliated to Shyam

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Shah Medical College at Rewa, Madhya Pradesh, India for a period of 4 months, from July 1, to October 31, 2007. During this period, hospital record of deliveries conducted during the year 2005 (from January 1, 2005 to December 31, 2005) was reviewed. The year 2005 was deliberately chosen for the assessment of hospital records as it represents the middle year of the decade (2001-2010), and thus the data generated could be used as a tool to generalize the results for the decade. Institutional Ethical Clearance was obtained prior to the study.

Data extraction

Available medical records were reviewed with prior permission from the Department of obstetrics and gynecology. Data were recorded in a computerized proforma (computerized MIS software for retrospective study in Rewa). The birth register for the year 2005, as obtained from the labor room was used as a primary source of information. All missing data were confirmed from available case sheets in obstetrics and gynecology department. Data compilation and analysis were done in Department of Community Medicine at Shyam Shah Medical College, Rewa. Information was collected regarding specific variables for the deliveries that occurred in year 2005: sex of the baby at birth, birth outcome, viability of new-born at birth, birth weight, mode of delivery, residence of mother, educational status of mother, age of mother at the time of delivery, occupation and religion of mother, obstetrics score, etc.

Statistical analysis

It was performed using SPSS (IBM SPSS Software version 14.0). All values are expressed as percentage, rounded off to the first decimal digit or as mean ± standard deviation. The association of sociodemographic characteristics of the mothers for single deliveries and multiple deliveries were compared using Chi-square test for the categorical variables. The outcome of single and multiple births for various variables were compared using unpaired t-test. A $P \leq 0.05$ was considered to be statistically significant.

Results

A total of 4170 deliveries were recorded in year 2005 at Gandhi Memorial Hospital, Rewa. The overall prevalence of multiple births, as estimated from the total number of deliveries in the year 2005 was 29/1000. Of these multiple pregnancies, male births constituted for about 2.3%, whereas female births approximately 3.6%. Table 1 describes the association of the sociodemographic variables of the mother and birth outcomes with single and multiple deliveries. Majority of the mothers were housewives (97.5%) with approximately three-fourth of being literate (75.2%). Most of deliveries (69%) conducted were of mothers living in rural areas with only 31% done on the mothers residing in nearby urban areas. The mean age of mothers was 23.16 ± 3.69 with the maximum number of multiple deliveries 80.1% (98 of 121) were observed in mothers in the age group 20-29 years. The mean age of first conception

was 21.95 ± 4.01. Proportion of multiple births was high for service class (17.1%) women as compared to housewives only (2.9%). A young age and service occupation was found to be statistically significant ($P = 0.000$ for both). The proportion of multiple births as compared to single births was observed maximum at fourth birth order or higher 4.4% and least at the first birth order 0.8%. Proportion of stillborn was 9.1% among multiple births when compared with 1.8% among singleton deliveries. Proportion of low birth weight babies (LBW) among multiple births was 29.8% when compared to 19.3% in singleton births. The mean birth-weight for singleton deliveries was (2638 ± 430 g) while (2322.4 ± 446.7 g) for multiple deliveries. Cesarean section was adopted in 14% of multiple births when compared with 11.4% in single births. Perhaps, assisted deliveries were carried out in 8.3% of the former births as compared to 3.2% in the latter. Birth weight and type of delivery were predictors of birth outcomes in both single and multiple deliveries (with $P \leq 0.05$).

Discussion

The crude multiple birth ratio in Indian communities varies from 7-8 to 11-53/1000 live births [2]. In our study, the prevalence lies within this range with overall prevalence, as estimated from our records as being 29/1000 births. It was reportedly higher than 17.5/1000 as reported by Mazhar et. al. [8]. This minimally high prevalence of multiple births could be attributed to a tertiary health care setup at our institute that received numerous referrals for complicated cases and multiple gestations from nearby primary and secondary health care hospitals and private practitioners with limited logistical setup to deal with high-risk pregnancy. We also included twins, triplet and all other kind of multiple gestations as multiple births in our study.

The observed data for a high proportion of multiple deliveries (81%) at 20-29 years of maternal age group was similar to the findings posted by Saima Aziz et. al. [9] The latter [9] reported a high proportion (40.3%) of multiple pregnancy in the maternal age range of 25-29 years. These result could probably be linked to the fact that the average age of first conception in developing counties including India is lower [21.95 ± 4.01 in our study as depicted in Table 1] and with a young age of first conception, the chance of subsequently becoming pregnant (higher birth orders) is thus at a relatively young age; young age and higher birth orders have been implicated in multiple pregnancy. Higher incidence of multiple births in comparison to single births was observed at an advanced age of mothers with the maximum at 35-39 years (25%). According to the United States 2006 Health Statistics data, women in their 30s are more likely than younger women, to conceive multiples spontaneously [10]. In our study, occurrence of multiple births when compared to singleton births among different age groups was found highly statistically significant. As in a similar study by Blondel and Kaminski [5], one-fourth to one-third of the increase in twin or triplet pregnancies are attributable to a contemporaneous increase in

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Table 1: Association of sociodemographic variables and birth outcomes with single and multiple deliveries				
Sociodemographic characteristics	Single deliveries (*n*=4049)	Multiple deliveries (*n*=121)	Total deliveries (*n*=4170)	*P* value
Sex of baby at birth				
Male	2133 (97.7)	50 (2.3)	2183 (52.4)	0.903
Female	1916 (96.4)	71 (3.6)	1987 (47.6)	
Religion of mother				
Hindu	3787 (97.2)	111 (2.8)	3898 (93.5)	0.431
Muslim	262 (96.3)	10 (3.7)	272 (6.52)	
Occupation of mother				
Housewife	3956 (97.2)	114 (2.8)	4070 (97.6)	0.000[a]
Labor	64 (98.5)	1 (1.5)	65 (1.6)	
Service	29 (82.9)	6 (17.1)	35 (0.8)	
Business	0 (0.0)	0 (0.0)	0 (0.0)	
Other	0 (0.0)	0 (0.0)	0 (0.0)	
Mean age±SD (years)	23.16±3.69			
Mean age±SD (years) for first conception	21.95±4.01			
Age of mother (years)				
15-19	521 (99.2)	4 (0.8)	525 (12.6)	0.000[a]
20-24	2212 (97.3)	62 (2.7)	2274 (54.5)	
25-29	944 (96.3)	36 (3.7)	980 (23.5)	
30-34	366 (95.6)	17 (4.4)	383 (9.2)	
35-39	6 (75)	2 (25)	8 (0.2)	
40 and above	0 (0.0)	0 (0.0)	0 (0.0)	
Residence				
Urban	1259 (97.4)	33 (2.6)	1292 (31)	0.370
Rural	2790 (96.9)	88 (3.1)	2878 (69)	
Educational status of mother				
Illiterate	1000 (96.8)	33 (3.2)	1033 (24.8)	0.518
Literate	3049 (97.2)	88 (2.8)	3137 (75.2)	
Birth order				
1st	1809 (99.2)	27 (0.8)	1836 (44.1)	0.000[a]
2nd	1350 (97.3)	43 (2.7)	1393 (33.4)	
3rd	569 (96.3)	37 (3.7)	606 (14.5)	
4th and above	321 (95.6)	14 (4.4)	335 (8)	
Birth weight				
Weight<2.5 kg	782 (19.3)	36 (29.8)	818 (19.6)	0.000[a]
Weight>2.5 kg	2556 (63.1)	54 (44.6)	2610 (62.6)	
Not available	711 (17.6)	31 (25.6)	742 (17.8)	
Mean birth weight±SD (g)	2638.5±430	2322.4±446.7	2610.5±326	0.000[a]
Mode of delivery				
Normal	3467 (85.4)	94 (77.7)	3561 (85.4)	0.01[a]
Assisted	125 (3.2)	10 (8.3)	135 (3.2)	
Caesarian	457 (11.4)	17 (14)	474 (11.4)	
Viability at birth				
Live births	3977 (98.2)	110 (90.9)	4087 (98)	0.000[a]
Still births	72 (1.8)	11 (9.1)	83 (2.0)	
SBR[†]	17.8	90.9		

SD: Standard deviation, SBR: Still birth rate. [†]Still birth rate is calculated as the total number of babies born dead weighing over 1000 g/live births+stillbirths×1000 (per 1000 live births). [a]*P*<0.05 for comparison of birth outcomes for single and multiple deliveries. Data in parenthesis indicates percentages

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maternal age. Likewise, we observed maximum proportion of multiple births occurred at fourth birth order or higher birth order (4.4%) and least at first birth order (0.8%), and the difference was found to be statistically significant showing multigravida mothers to have a higher chance of multiple births in comparison to primigravida. In a similar study by Chowdhury et. al. [11], higher incidence of multiple births was reported among multigravida as compare to primigravida. The proportion of LBW from our hospital records showed 29.8% for multiple births as compared to 19.3% for singleton births and the difference being statistically significant. The results were slightly lower to that reported (44%) by Chowdhary et. al. [11] most probably due to unavailability of birth weight records of 25.6% multiple births. Mean birth-weight among multiple births was 2322.4 ± 446.7 g, which was lower when compared to single deliveries 2638 ± 430 g and the difference was found to be statistically significant ($P = 0.000$). A study on perinatal outcomes of multiple births in Southwest Nigeria by Olusanya [12], similarly showed, after adjusting for potential maternal confounders, infants of multiple gestations are associated with birth weight of <2500 g (odds ratio [OR]: 6.45, 95% confidence interval [CI]: 4.80-8.66), and intrauterine growth restriction (OR: 9.04, 95% CI: 6.62-12.34); implying a significantly-elevated risk of adverse perinatal outcomes.

In our study, more caesarian as well as assisted modes of delivery took place for multiple births as reported Mazhar [8]. More use of cesarean mode of delivery and assisted deliveries among multiple births showed a need of highly equipped hospital setups. Similarly, Olusanya [12], after adjusting for maternal age, ethnicity, occupation, parity, and antenatal care, documented multiple gestations being associated with increased risks of cesarean delivery. Still birth rate was 5 times more for multiple births (90.9/1000 live births) as compared with single births (17.8/1000 live births) and the data being consistent with the study by Gardosi et. al. [13] and Sliver et. al. [14]

Recommendations and study limitations
Timely detection of high-risk pregnancies and establishment of specially equipped cell for management of high-risk pregnancy is recommended from our observation to lower the adverse outcomes of multiple pregnancies. The major drawback of our study is being a retrospective observational design that generated record from past hospital records. Hence, the data generated can only give a fair estimate of the complications and difficulties associated with multiple births when compared to prospective design. Moreover, the records were limited to one hospital, hence cannot be generalized.

Conclusion

With an overall prevalence of 29/1000 births for multiple births, among the total 4170 deliveries, our data suggest higher birth order along with young age of mother to be strongly implicated in the higher incidence of multiple

births. Perhaps the outcome of multiple births resulted in LBW babies and accounted for the higher incidence of still births, cesarean and assisted deliveries as compared with single births. Awareness regarding the need of antenatal care, timely detection and management of high-risk pregnancies, concerted efforts by the community and obstetricians, highly equipped heath care centers, and the presence of comprehensive neonatal intensive care facilities at public-sector hospitals are the key to preventing maternal complications and improving neonatal outcome in multiple births.

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Author's Contributions
SPT and SSK conceptualized the study design, participated in data collection. SPT analyzed, drafted the manuscript, and contributed in the revision of the literature. SPT and APS contributed in literature search and preparation editing and reviewing of the manuscript. All authors read and approved the final manuscript.

Competing Interest
Nil

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