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Original Article

The Linkage of Grand Multiparity with Associated Risks During Pregnancy and Childbirth: A Cross-Sectional Study at Tertiary Care Hospital

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ABSTRACT

Objective: To investigate the risk factors associated with grand multiparityn during pregnancy and childbirth.
Study Design: Cross-sectional study.
Place and Duration of Study: Gynaecology and Obstetrics Department, Pakistan Emirates Military Hospital, Rawalpindi, Pakistan from Dec 2022 to Oct 2023.
Methodology: Three hundred twenty-two (n=322) women from the Pakistan Emirates Military Hospital, labor ward, Rawalpindi, Pakistan, gynecology and obstetrics department participated in this research. Primiparous, Multiparous, and grand multiparous females were included in the study for various demographic, maternal, and neonatal factors.
Results: Primiparous women were higher in number than multiparous and GMP women [202(62.7%), 109(33.8%), and 11(3.4%), respectively). Among the risk factors associated with GMP, there was a greater incidence of miscarriage, i.e., 59.1% in GMP, and Gestational diabetes (27.2% in GMP) and spontaneous preterm delivery (45.4% in GMP) were the two most common problems linked with pregnancy in GMP women. The primary neonatal consequence observed was low birth weight (32.1% in PM), with a prevalence of 32.1%. However, the percentage of infants with an APGAR score below 7 at 5 minutes was higher in the GMP (36.3%).
Conclusion: When compared to other parity groups, grand multiparous Pakistani women face the same risks of maternal and newborn problems. In GMP, advanced age may have a significant impact on pregnancy outcomes. Nonetheless, grand multiparty may not be outlawed, given that women receive adequate prenatal care.

Keywords: APGAR score, Grand Multiparity, Gestational diabetes, Preterm delivery, Low birth weight,

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INTRODUCTION

A mother is considered to have grand multiparity if she gives birth to five children at a gestational age of at least 20 weeks. Grand multiparity, which has a low incidence of 2-4% in many industrialised countries, is becoming less of a problem due to the readily accessible feto-maternal health facilities, reproductive health centres, education and family planning, cultural and social impacts, and healthcare infrastructure [1,2]. However, an elevated incidence of 19% in developing and under-developed countries remains a significant public health concern.[1] GMP is linked to increased risks of obstetric problems worldwide, including congenital abnormalities, low APGAR scores, perinatal death, preterm birth, birth asphyxia, maternal anaemia, low birth weight, postpartum haemorrhage, gestational diabetes, and gestational hypertensive disorders.[2] When compared to high-income countries, perinatal outcomes complications are still comparatively high in low- and middle-income nations, such as Pakistan's grand multiparity.[3]

Grand multiparity is a prevalent concern in Asia, encompassing Pakistan as well, on account of its significant prevalence and possible implications for the health of mothers and newborns in the region. A considerable rise in hypertension and anaemia was noted by Akhtar *et al*.[4] in a group of grand multiparous Pakistanis. Grand multiparity is still common in Pakistan, so it stands to reason that GMP would be a risk factor for pregnancy-related issues in that population .[5,6]

When it comes to GMP cases, obstetricians are primarily concerned with feto-maternal outcomes .[7-9]

Due to a lack of reproductive awareness, an unmet need for contraception, a desire for sons, poor obstetric performance (both), and premature marriage, Pakistan will continue to have multiparity and grand multiparty systems.[10] Because the available results are inconclusive, more investigation is required to determine the precise effect of GMP on gestational and neonatal outcomes. Moreover, there is a scarcity of

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data investigating the impact of grand multiparity on feto-maternal outcomes in Pakistan. Therefore, the current study aimed to explore the impact of GMP on feto-maternal outcomes in our facility.

METHODOLOGY

The cross-sectional study was conducted at the Gynecology and Obstetrics Department of Pakistan Emirates Military Hospital (PEMH), Rawalpindi, Pakistan, from December 2022 to September 2023, after obtaining approval from the Ethical Review Committee (A/28/164(1)/EC/474/2022). Sample size was calculated using WHO sample size calculator taking reported prevalence of Grand Multiparity-associated Feto-Maternal Problems 30%.[11]

Inclusion Criteria: Inclusion criteria for the study were Grand multiparous (Para 5-9) women and Multiparous (Para 2-4) women, and Primiparous women (Experiencing first pregnancy).

Exclusion Criteria: Women with multiple chronic pregnancies, mental disorders, pre-gestational immunological disorders, and communication difficulties were excluded.

This hospital was selected based on its comprehensive array of maternity and neonatal care services. Based on the reported follow-up of hospital customers from last year's delivery admission and using odds proportional to sample size, an acceptable sample size was given to this facility. Once the target sample size was achieved, the study participants were selected via systematic sampling. Patients (multiparous & grand multiparous women) were selected from the Department of Gynecology and Obstetrics at Military Hospital, Rawalpindi.

Following the approval from ERC, written consent was obtained from the patients. The data collection tools were developed in English and then orally translated into the local language (Urdu/Punjabi) by language specialists so that women with any background could easily comprehend it and respond accordingly.

The questionnaires were designed after comprehensively evaluating various forms of published material. Participants' interview questionnaires comprised sections about the patient's information, sociodemographic parameters, obstetrics and reproductive health history, maternal health care received during prior conceptions, nutritional well-being of women, and adverse pregnancy outcomes. In this cross-sectional study, the data was collected from the time of hospitalization hospitalisation till delivery in the maternity wards at MH, Rawalpindi, Pakistan. The analysis of paper medical documents was performed to determine the medical condition of the women during their pregnancy. Postpartum, adverse maternal and neonatal outcomes were observed.

The data was analysed with SPSS (Statistical Package for Social Sciences) version 22.0. Quantitative variables such as age, gestational age, BMI at delivery, education level, and employment status of study participants were presented as mean and standard deviation. Qualitative variables such as parity, History of miscarriage, pre-existing hypertension, gestational hypertension, preeclampsia, intrauterine growth restriction, low birth weight, APGAR score at 5 min <7, congenital anomalies, and gestational diabetes were presented as frequency and percentages. Univariate analysis and differences between groups were assessed using the one-way Analysis of Variance (ANOVA), or Chi-square test when appropriate. Multivariate logistic regression analysis was used to adjust for the age difference among the studied groups and adjusted odds ratios were calculated for feto-maternal outcomes.

RESULTS

There were 322 deliveries throughout the study period, of which 202(62.7%) were primiparas, 109(33.8%) were multiparas, and 11(3.4%) were grand multiparas. Variables related to reproduction and demographics are shown in Table-I.

Table -I: Demographic and Reproductive Variables (n=322)

Study Parameters	Values
Age groups (n/%)	
Less than 25 years	87(27%)
25 to 35 years	193(60%)
More than 35 years	42(13%)
Education (n/%)	
School level	265(82%)
College or university-level	57(17.7%)
Employment status	
Unemployed	249(77.3%)
Employed	73(22.6%)
Reproductive Variables	
Gestational age at delivery (weeks) (Mean±SD)	28.43±5.82
BMI at delivery (Kg/m^2; Mean±SD)	24.61±1.92
History of miscarriage (n,%)	81(25%)
History of multiple pregnancy (n,%)	16(4.96%)
History of Hypertension (n,%)	5(1.5%)
History of Diabetes mellitus (n,%)	7(2.1%)
Intrauterine growth restriction (n,%)	97(30.12%)
Spontaneous preterm delivery (n,%)	99(30.74%)
Induction of Labor (n,%)	102(31.6%)
Low Birth Weight (n,%)	97(30.12%)
APGAR at 5 min <7 (n,%)	76(23.6%)
Congenital Anomalies (n,%)	98(30.43%)

In terms of age distribution, 193(60%) (25-35 years old), comprised most participants. Those under 25 years, 87(27%), and those over 35 years, 42(13%), made up the next largest group. A considerable majority of the population had only completed school, 265(82%) versus 57(17.7%) for college or university. According to their employment status, 249 individuals (77.3%) were unemployed, while 73 participants (22.6%) were employed. The BMI and gestational age at delivery were two reproductive factors that were given as mean values with standard deviations. Remarkably, a high number of participants—81(25%)—had a history of miscarriage. These were followed by fewer people who reported having had multiple pregnancies 6(4.96%), hypertension 5(1.5%), and a history of diabetes 7(2.1%).

Study participants were majorly stratified into three groups based on parity. Demographic information, pregnancy outcomes, and neonatal outcomes were compared between primipara, multipara, and grand multipara women in Table-II. Considerable variations were noted among a range of indicators. The mean age of grand multipara women was significantly higher at 39.3 years, in contrast to primipara women at 25.7 years and multipara women at 30.9 years (p<0.001). Significant variations were observed in education level among the participants. Specifically, a greater percentage of primipara women possessed a school-level education in contrast to multipara and grand multipara women (87.1% vs. 71.5% and 63.6%, respectively; p=0.001). In addition, the BMI of grand multipara women was 35.8±6.6 kg/m^2 at delivery, which was significantly higher than that of primipara and multipara women (29.7±4.7 and 30.7±5.9 Kg/m^2, respectively; p<0.001). The prevalence of hypertension and a history of miscarriage increased with parity, with the greatest rates observed in grand multipara women (59.1% and 9.0%, respectively; p<0.001). Furthermore, grand multipara women had a higher prevalence of gestational hypertension (36.3%) and low APGAR scores at 5 minutes (36.3% and 36.3%, respectively; p<0.001 and p=0.006, respectively). It is worth mentioning that the incidence of congenital anomalies was significantly higher in multipara and grand multipara women (37.6% and 45.4%, respectively; p=0.05) than in primipara women. The results of this study draw attention to the unique demographic and clinical characteristics of primipara, multipara, and grand multipara women, indicating the necessity for personalised prenatal care and interventions in accordance with parity status.

Table-II: Comparison of the Study Participants' Demographic Data, Pregnancy, and Neonatal Outcomes according to Paritya (n=322)

Indicators	Primipara n=202 (62.7%)	Multipara n=109 (33.8%)	Grand Multipara n=11 (3.4%)	*p*-value
Age (years; Mean±SD)	25.7±3.9	30.9 ± 4.1	39.3 ± 3.9	<0.001
Education n(%):				
School level	176 (87.1%)	78(71.5%)	7(63.6%)	0.001
College or university-level	36 (17.8%)	19(17.4%)	0(0%)	0.308
Employment status n(%):				
Employed	98 (48.5%)	48(44%)	2(18.1%)	0.128
Gestational age at delivery (Mean±SD)	38.6±1.4	38.7±1.9	38.9±2.9	<0.001
BMI at delivery (Kg/m2; Mean±SD)	29.7±4.7	30.7±5.9	35.8±6.6	<0.001
History of miscarriage (n,%)	35(17.2%)	40(36.6%)	6(59.1%)	<0.001
History of Hypertension (n,%)	2(0.9%)	3(2.7%)	1(9.0%)	<0.001
Gestational hypertension	3(1.4%)	2(1.8%)	4(36.3%)	<0.001
Preeclampsia	18(8.9%)	6(5.5%)	0(0%)	0.147
Intrauterine growth restriction	59(29.2%)	36(33.0%)	2(18.1%)	0.532
Spontaneous preterm delivery	65(32.1%)	29(26.6%)	5(45.4%)	0.335
Induction of labour	70(34.6%)	29(26.6%)	3(27.2%)	0.329
Low birth weight	65(32.1%)	29(26.6%)	3(27.2%)	0.580
APGAR at 5 min <7	36(17.8%)	36(33%)	4(36.3%)	0.006
Congenital Anomalies	52(25.7%)	41(37.6%)	5(45.4%)	0.05
Gestational diabetes	42(20.7%)	26(23.8%)	3(27.2%)	0.753

asignificant value p<0.05

The univariate and multiple logistic regression analysis, in Table-III, yielded unadjusted odds ratio (UAOR) adjusted odds ratios (AORs), indicating noteworthy correlations between specific variables and unfavorable fetal-maternal outcomes in grand multipara women. Gestational hypertension was identified as a significant risk factor among the

Table-III: Adjusted Odds Ratio (AOR) of feto-Maternal Outcomes of GMP Women (n=322)

Factors	Study Parameters		Univariate Logistic Regression			Multivariate Logistic Regression		
	Yes	No	UAOR	95% CI	*p*-value	AOR	95% CI	*p*-value
Maternal Outcomes								
Gestational hypertension	5(1.5)	317(98.4)	0.162	0.120 to 0.309	<0.001	0.006	0.00 to 0.21	<0.005
Intrauterine growth restriction	97(30.12)	225(69.8)	0.355	0.054 to 0.387	0.010	0.008	0 to 0.277	0.45
Spontaneous preterm delivery	65(32.1)	257(79.8)	0.049	0.121 to 0.184	0.683	0.008	0 to 3.6	0.008
Gestational diabetes	7(2.1)	315(97.8)	0.076	0.055 to 0.158	0.342	1.115	0.01 to 1.24	0.07
Induction of Labor	70(34.6)	252(78.2)	0.061	0.218 to 0.138	0.659	0.139	0.014 to 1.38	0.09
Neonatal Outcomes								
APGAR at 5 min <7	36(17.8)	286(88.8)	0.337	0.378 to 0.034	0.019	0.038	0.002 to 0.65	0.02
Congenital Anomalies	52(25.7)	270(83.8)	0.009	0.138 to 0.127	0.934	0.008	0. to 0.307	0.009

variables analyzed, with an adjusted odds ratio (AOR) of 0.006 (95% CI: 0.00 to 0.21) and a *p*-value below 0.005. Furthermore, adverse outcomes were found to be significantly associated with APGAR at 5 minutes or less and congenital anomalies, with AORs of 0.038 (95% CI: 0.002 to 0.65) and 0.008 (95% CI: 0 to 0.307), respectively, and *p*-values less than 0.05. Grand multipara women with gestational hypertension, infants with congenital anomalies, or lower APGAR scores at 5 minutes may have an increased risk of adverse feta-maternal outcomes, according to these findings. On the contrary, no significant associations were observed between adverse outcomes and other variables, including intrauterine growth restriction, spontaneous preterm delivery, low birth weight, gestational diabetes, and labor induction, as indicated by their non-significant *p*-values.

DISCUSSION

Grand multiparity is infrequent in developed countries due to the readily accessible feto-maternal health facilities, reproductive health centers, education and family planning, cultural and social impacts, and healthcare infrastructure.[1] However, it is prevalent in developing countries such as Pakistan. The prevalence of grand multiparity observed in this study is similar to that reported in other investigations conducted in the same country.[11] In the Middle Eastern region, especially Pakistan, there is a robust cultural appreciation for large families, which indicates high fertility.[12]

Among the causative socioeconomic factors, culture plays a significant role in adverse feto-maternal outcomes in GMP women. In Pakistan, there is an enormous cultural appreciation for large families, which indicates high fertility.[13] Furthermore, the prevalence of GMP in Pakistani has been heightened by the cultural norms of early marriages and religious practices that discourage the use of contraception.[14,15] Moreover, data is limited regarding the correlation and characteristics of maternal and newborn problems with GMP, particularly among individuals of Pakistan.

It is noteworthy that the three groups displayed almost similar socio-demographic features. Nevertheless, grand multiparas exhibited a significantly older average age (39.3 years), a trend that aligns with the results of other cohort studies.[7,8] In addition, we noted a disparity in educational achievement across the three groups, with primiparous women 36(17.8%) attaining more significant levels of higher education education as also documented in prior research.[7] However, a research study that compared primiparas and multiparas with GMP women and categorized them by age discovered that there was no notable variation in educational attainment when examining the subset of young GMP mothers (below 35 years old).[9] Similar findings were observed in employment status, i.e., only 2(18.1%) GMP women were employed as compared to 98(48.5%) and 48(44%) primiparous and multiparous women, respectively. These results show intricate relationship between educational achievement, age, employment status, and multiple pregnancies in the specific group of people.[9]

We examined several pregnancy and newborn related problems among different parity groups, comparing their prevalence and possible risk of GMP. It can be noted that gestational hypertension (AOR 0.006, *p*=<0.005), gestational diabetes (AOR 1.115, *p*=0.07) and spontaneous preterm delivery (*p*=0.008) are the adverse outcomes experienced by the GMP women during pregnancy. Lee *et al*.[16] and Parveen *et*

al.[17] have previously observed a rise in spontaneous preterm delivery among the GMP women in the research.

The most adverse neonatal problems found in this study were APGAR at 5 min <7 (AOR=0.038, *p*=0.02) and Congenital Anomalies (OR=0.008, *p*=0.009) (Table III). Conversely, neonates of GMP women had a lower occurrence of low birth weight than other parity groups. This exceptional outcome can be attributed to the small sample size in comparison to the other studies that obtained a different outcome in this factor. However, numerous studies have reported higher incidence of low birth weight in the infants of GMP women.[18-20] According to our findings, a comprehensive evaluation that included a meta-analysis of 41 research studies concluded no link between GMP and low birth weight. The latter experienced a substantial increase in primiparas.[18]

Furthermore, foetal growth might be affected by additional factors such as chronic maternal illnesses, for example, anaemia, diabetes mellitus, and hypertension.[19] Another crucial consideration is maternal health, which is strongly associated with various adverse pregnancy outcomes. Recurring pregnancies and nursing increase the likelihood of inadequate mother nutrition.[20,21]

Given the widespread occurrence of GMP and the lack of access to family planning in Pakistan, it is imperative to offer comprehensive and sufficient healthcare treatments to these women to minimise the possible hazards of consequences. 22 Moreover, providing health education on weight management and nutritious eating to middle-aged women in the GMP population could potentially decrease the likelihood of maternal and newborn problems. Healthcare professionals must establish policies and develop suitable health education strategies to decrease avoidable maternal and newborn problems and enhance the standard of prenatal care.

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CONCLUSION

Grand multiparity poses a significant risk for challenging maternal outcomes throughout pregnancy and childbirth. Among the adverse maternal outcomes were spontaneous preterm delivery, gestational diabetes, and miscarriage. Meanwhile, among the adverse fetal outcomes were lower APGAR scores. Effective risk factor reduction can be achieved by providing high-quality prenatal care and delivery services by well-trained healthcare workers. For low-resource settings, we suggest implementing public health programs and providing readily available and effective contraceptive treatments as a method to prevent women from having a large number of pregnancies.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AK & BA: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

TY & SZ: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SFC: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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