



A Cross-Sectional Investigation of Serum Cholesterol, Blood Glucose, and Body Mass Index Differences Between Elderly Primigravida and Multigravida

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ABSTRACT: Background: With an increasing trend of delayed childbearing, pregnancies at advanced maternal age (AMA; ≥ 35 years) are becoming more common, especially in industrialized and developing countries alike. While AMA has traditionally been linked to increased pregnancy complications, the impact of maternal age on metabolic parameters during pregnancy remains underexplored, particularly in Bangladesh. **Objective:** This study aimed to compare serum cholesterol levels, blood glucose, and BMI between elderly primigravidae and multigravidae in the mid-second trimester. **Methods:** A cross-sectional study was conducted from January to April 2025 at three hospitals in Khulna, Bangladesh, enrolling 272 pregnant women aged ≥ 35 years—132 primigravidae and 140 multigravidae. Sociodemographic data, obstetric history, and mid-second trimester laboratory values (serum lipids, HbA1c, and BMI) were collected and analyzed. **Results:** The mean age was 36.8 ± 1.7 years for primigravidae and 37.5 ± 2.1 years for multigravidae. Hypertension and diabetes were more prevalent among multigravidae (22.1% and 18.6%) than primigravidae (16.7% and 12.1%). Multigravidae exhibited higher mean BMI (27.3 ± 3.5 kg/m² vs. 26.1 ± 3.2 kg/m²), total cholesterol (217.8 ± 31.4 mg/dL vs. 205.5 ± 28.3 mg/dL), LDL (134.7 ± 25.1 mg/dL vs. 126.4 ± 22.6 mg/dL), triglycerides (175.5 ± 34.1 mg/dL vs. 162.1 ± 30.6 mg/dL), and HbA1c ($5.9\% \pm 0.8$ vs. $5.6\% \pm 0.7$), while HDL levels were slightly lower. Mean hemoglobin levels were also marginally lower in multigravidae. **Conclusion:** Elderly multigravidae demonstrated significantly higher BMI, dyslipidemia, and glycemic markers compared to primigravidae, suggesting an elevated metabolic risk profile. These findings underscore the importance of tailored antenatal monitoring and nutritional counseling in elderly pregnant women, particularly those with previous pregnancies.

Keywords: Serum Cholesterol, Blood Glucose, Body Mass Index, Primigravida, Multigravida.

INTRODUCTION

In recent decades, there has been a growing trend among women in industrialized countries to delay childbearing. As a result, pregnancies at an advanced maternal age (AMA), defined as 35 years or older, have become increasingly common [1, 2]. Traditionally, AMA has been associated with a heightened risk of pregnancy-related complications

such as pre-eclampsia, gestational diabetes, placental abruption, pre-term delivery, and an increased rate of caesarean sections [3-6]. Furthermore, higher rates of perinatal complications have been reported among this population [7, 8]. However, recent studies have questioned the extent to which AMA alone acts as a risk factor for adverse obstetric and perinatal

outcomes, particularly in women without underlying conditions such as hypertension or diabetes [8, 9]. Callaway et al. studied pregnancy outcomes in women aged 45 years and older and found no significant differences in maternal and neonatal outcomes compared to younger mothers, except for a notably higher rate of caesarean deliveries [10, 11]. Similarly, a study by Suzuki et al. involving women who conceived through IVF found no major differences in obstetric outcomes, aside from a higher incidence of pregnancy-induced hypertension in the younger group [9]. As pregnancies at advanced maternal age become more prevalent, understanding the metabolic differences between elderly primigravidae and multigravidae is critical. Variations in serum cholesterol, blood glucose levels, and body mass index (BMI) during pregnancy can significantly impact maternal and fetal outcomes. Despite the rising number of elderly pregnancies in Bangladesh, limited data exist comparing these key metabolic parameters between elderly primigravidae and multigravidae. Therefore, this study aims to investigate and compare serum cholesterol levels, blood glucose levels, and BMI between elderly primigravidae and multigravidae during the mid-second trimester, providing insights into potential metabolic differences that may influence pregnancy outcomes.

METHODOLOGY

This cross-sectional study was conducted in Khulna, Bangladesh, over four months from January to April 2025. Data were collected from three medical institutions: Gazi Medical College Hospital, Khulna City Medical College Hospital, and Khulna Medical College Hospital. The study population consisted of elderly pregnant women, defined as those aged 35 years and above. A total of 272 participants were enrolled, comprising 132 elderly primigravidae (women experiencing their first pregnancy) and 140 elderly multigravidae (women with previous pregnancies). Participants were selected using a purposive sampling technique. Blood test reports, specifically serum cholesterol and blood glucose levels, were reviewed for each participant between the 15th and 20th weeks of gestation. Body Mass Index (BMI) was calculated based on recorded height and weight measurements taken during their antenatal visits.

Additionally, detailed obstetric histories were obtained, including information regarding previous diagnoses of diabetes mellitus (DM) and hypertension (HTN). Standardized protocols were followed to ensure the accuracy and consistency of data collection across the three institutions. All relevant ethical considerations were observed, and informed consent was obtained from all participants before enrollment.

RESULTS

A total of 272 elderly pregnant women participated in the study, including 132 elderly primigravidae and 140 elderly multigravidae. The mean age of primigravidae was 36.8 ± 1.7 years, while that of multigravidae was 37.5 ± 2.1 years. Sociodemographic characteristics, medical history, and laboratory parameters are presented in Tables 1 to 4. Regarding educational status, 48.5% of primigravidae and 44.3% of multigravidae had completed graduation or higher education. Most participants were housewives (78.8% primigravidae, 81.4% multigravidae), with the remainder engaged in service or business. The prevalence of hypertension (HTN) was 16.7% in primigravidae and 22.1% in multigravidae, while diabetes mellitus (DM) was observed in 12.1% and 18.6%, respectively. History of heart disease was noted in 4.5% of primigravidae and 5.7% of multigravidae, while renal disease was rare (1.5% and 2.1%, respectively). Mean BMI was higher among multigravidae (27.3 ± 3.5 kg/m²) compared to primigravidae (26.1 ± 3.2 kg/m²). Laboratory investigations revealed that serum total cholesterol, LDL cholesterol, and triglyceride levels were significantly higher in multigravidae, while HDL cholesterol was slightly lower. Mean HbA1c was elevated among multigravidae ($5.9\% \pm 0.8$) compared to primigravidae ($5.6\% \pm 0.7$). HBsAg positivity was detected in 2.3% of primigravidae and 2.9% of multigravidae. The mean hemoglobin (Hb%) was marginally lower among multigravidae.

Table 1. Sociodemographic and Clinical Characteristics

Variables	Elderly Primigravidae (n=132)	Elderly Multigravidae (n=140)
Age (years), mean $\pm$ SD	36.8 $\pm$ 1.7	37.5 $\pm$ 2.1
Education (%)		
- SSC or below	22 (16.7%)	30 (21.4%)
- HSC	46 (34.8%)	48 (34.3%)
- Graduation or above	64 (48.5%)	62 (44.3%)
Occupation (%)		
- Housewife	104 (78.8%)	114 (81.4%)
- Service/Business	28 (21.2%)	26 (18.6%)

Table 1 illustrates the sociodemographic characteristics of the study participants. The mean age of elderly primigravidae was 36.8 $\pm$ 1.7 years, while for elderly multigravidae it was slightly higher at 37.5 $\pm$ 2.1 years. Among primigravidae, 16.7% had education up to SSC or below, 34.8% completed HSC, and 48.5% were graduates or above. In comparison, among multigravidae, 21.4%

had SSC or below, 34.3% completed HSC, and 44.3% were graduates or above. In terms of occupation, the majority in both groups were housewives — 78.8% among primigravidae and 81.4% among multigravidae — while 21.2% and 18.6% respectively were engaged in service or business.

Table 2. Medical History

Variables	Elderly Primigravidae (n=132)	Elderly Multigravidae (n=140)
Hypertension (%)	22 (16.7%)	31 (22.1%)
Diabetes Mellitus (%)	16 (12.1%)	26 (18.6%)
Heart Disease (%)	6 (4.5%)	8 (5.7%)
Renal Disease (%)	2 (1.5%)	3 (2.1%)

Table 2 describes the medical history of the participants. The prevalence of hypertension was 16.7% in elderly primigravidae and 22.1% in elderly multigravidae. Diabetes mellitus was present in 12.1% of primigravidae and 18.6% of

multigravidae. heart disease was reported in 4.5% of primigravidae and 5.7% of multigravidae, while renal disease was relatively rare, affecting 1.5% and 2.1% of the groups respectively.

Table 3. BMI and Blood Test Profiles

Variables	Elderly Primigravidae (n=132)	Elderly Multigravidae (n=140)
BMI (kg/m ²), mean $\pm$ SD	26.1 $\pm$ 3.2	27.3 $\pm$ 3.5
Total Cholesterol (mg/dL), mean $\pm$ SD	205.5 $\pm$ 28.3	217.8 $\pm$ 31.4
LDL Cholesterol (mg/dL), mean $\pm$ SD	126.4 $\pm$ 22.6	134.7 $\pm$ 25.1
HDL Cholesterol (mg/dL), mean $\pm$ SD	51.2 $\pm$ 8.4	48.9 $\pm$ 7.9
Triglycerides (mg/dL), mean $\pm$ SD	162.1 $\pm$ 30.6	175.5 $\pm$ 34.1
HbA1c (%), mean $\pm$ SD	5.6 $\pm$ 0.7	5.9 $\pm$ 0.8
HBsAg Positivity (%)	3 (2.3%)	4 (2.9%)

Table 3 summarizes the BMI and serum blood profiles. The mean BMI was 26.1 $\pm$ 3.2 kg/m² in primigravidae and 27.3 $\pm$ 3.5 kg/m² in multigravidae. In the lipid profile, total cholesterol was 205.5 $\pm$ 28.3 mg/dL in primigravidae and 217.8 $\pm$ 31.4 mg/dL in multigravidae. LDL cholesterol was 126.4 $\pm$ 22.6 mg/dL among

primigravidae compared to 134.7 $\pm$ 25.1 mg/dL in multigravidae. HDL cholesterol was slightly higher in primigravidae (51.2 $\pm$ 8.4 mg/dL) compared to multigravidae (48.9 $\pm$ 7.9 mg/dL). Triglyceride levels were also lower in primigravidae (162.1 $\pm$ 30.6 mg/dL) than in multigravidae (175.5 $\pm$ 34.1 mg/dL). The mean HbA1c levels were 5.6 $\pm$ 0.7% in

primigravidae and $5.9 \pm 0.8\%$ in multigravidae, indicating slightly higher glycemic levels in

multigravidae. HBsAg positivity was found in 2.3% of primigravidae and 2.9% of multigravidae.

Table 4. Complete Blood Count (CBC) and Hemoglobin (Hb%)

Variables	Elderly Primigravidae (n=132)	Elderly Multigravidae (n=140)
Hemoglobin (Hb%), mean $\pm$ SD	11.7 ± 1.1	11.4 ± 1.2
Total White Blood Cells (cells/mm ³), mean $\pm$ SD	$8,300 \pm 1,200$	$8,500 \pm 1,300$
Platelet Count (cells/mm ³), mean $\pm$ SD	$240,000 \pm 45,000$	$235,000 \pm 43,000$

Table 4 details the complete blood count (CBC) and hemoglobin status. The mean hemoglobin (Hb%) was $11.7 \pm 1.1\%$ in primigravidae and $11.4 \pm 1.2\%$ in multigravidae, indicating a slightly lower mean. The total white blood cell (WBC) count was $8,300 \pm 1,200$ cells/mm³ among primigravidae and $8,500 \pm 1,300$ cells/mm³ among multigravidae. The mean platelet count was $240,000 \pm 45,000$ cells/mm³ in primigravidae and $235,000 \pm 43,000$ cells/mm³ in multigravidae.

DISCUSSION

The findings of this study provide valuable insights into the sociodemographic, clinical, and biochemical profiles of elderly primigravidae and multigravidae. Several noteworthy trends emerged, highlighting differences between these two groups in various aspects such as age, medical history, lipid profiles, and other health indicators. The mean age of elderly primigravidae (36.8 ± 1.7 years) was slightly lower than that of multigravidae (37.5 ± 2.1 years), which is consistent with the assumption that women who are pregnant for the first time at an older age tend to delay childbearing compared to women with previous pregnancies. This finding aligns with trends in industrialized countries where women are increasingly choosing to have children later in life due to factors such as career aspirations and financial stability [12]. In terms of educational attainment, both groups demonstrated relatively high levels of education, with the majority having completed HSC or higher education (83.3% of primigravidae and 78.6% of multigravidae). The majority of both groups were housewives (78.8% of primigravidae and 81.4% of multigravidae), which may reflect traditional gender roles within the community. In terms of medical history, hypertension and diabetes mellitus were more prevalent in elderly multigravidae compared to primigravidae, with

22.1% of multigravidae affected by hypertension and 18.6% by diabetes mellitus. This is consistent with previous studies that have shown a higher prevalence of comorbidities such as hypertension and diabetes in women who have multiple pregnancies, potentially due to the cumulative effects of gestational hypertension or diabetes during previous pregnancies. These comorbidities are well-established risk factors for adverse pregnancy outcomes, such as pre-eclampsia and gestational diabetes, which are more commonly observed in women of advanced maternal age (AMA) [4, 6]. Interestingly, the prevalence of heart disease and renal disease was low in both groups but slightly higher in the multigravidae group. This could be attributed to the longer exposure to cardiovascular risk factors in multigravidae due to the cumulative effects of multiple pregnancies and advancing age. The mean BMI was higher in elderly multigravidae (27.3 ± 3.5 kg/m²) compared to primigravidae (26.1 ± 3.2 kg/m²), which could indicate that women with previous pregnancies may have experienced greater weight gain over time. Obesity is a known risk factor for numerous pregnancy complications, including gestational diabetes, pre-eclampsia, and increased risk of cesarean delivery, which is often seen in women of advanced maternal age [5, 13, 14]. Furthermore, BMI is a key factor influencing lipid metabolism, which may explain the higher total cholesterol (217.8 ± 31.4 mg/dL) and LDL cholesterol (134.7 ± 25.1 mg/dL) levels observed in the multigravidae group. These findings align with previous research that suggests a higher risk of dyslipidemia and metabolic abnormalities in older women, particularly those with multiple pregnancies [6, 13]. HDL cholesterol levels were slightly higher in the primigravidae group (51.2 ± 8.4 mg/dL) compared to multigravidae (48.9 ± 7.9 mg/dL), which might indicate better cardiovascular health in this group. Higher HDL cholesterol is generally considered

protective against cardiovascular disease and may reflect healthier lifestyle choices or lesser exposure to risk factors in the primigravidae group. Triglyceride levels were also higher in multigravidae (175.5 ± 34.1 mg/dL) compared to primigravidae (162.1 ± 30.6 mg/dL), which is another indicator of increased cardiovascular risk in the multigravidae group. Elevated triglycerides are often associated with obesity, metabolic syndrome, and insulin resistance—conditions that are more common in women with multiple pregnancies. The mean HbA1c was higher in multigravidae ($5.9 \pm 0.8\%$) compared to primigravidae ($5.6 \pm 0.7\%$), indicating slightly poorer glycemic control in the multigravidae group. This difference is noteworthy, as HbA1c is a long-term marker of blood glucose control and may indicate a higher risk of gestational diabetes in multigravidae. However, both groups had HbA1c levels below the threshold of 6.5%, which is used to diagnose diabetes, suggesting that while there may be slight glucose dysregulation in both groups, overt diabetes was not prevalent. The low percentage of HBsAg positivity (2.3% in primigravidae and 2.9% in multigravidae) in both groups is consistent with the overall low prevalence of hepatitis B in the general population, which may reflect the implementation of vaccination and screening programs. The hemoglobin levels in both groups were within normal ranges, with primigravidae having a mean of $11.7 \pm 1.1\%$ and multigravidae having $11.4 \pm 1.2\%$. These values suggest no significant anemia in either group, as the World Health Organization defines anemia in pregnancy as hemoglobin levels below 11 g/dL. The total white blood cell (WBC) count was slightly higher in multigravidae ($8,500 \pm 1,300$ cells/mm³) compared to primigravidae ($8,300 \pm 1,200$ cells/mm³), but this difference is not clinically significant [14-50]. Platelet counts were also similar between the two groups, indicating no apparent issues with coagulation or platelet function.

CONCLUSION

In summary, this study highlights several important clinical and biochemical differences between elderly primigravidae and multigravidae. While elderly multigravidae showed higher BMI, cholesterol, and triglyceride levels, as well as slightly poorer glycemic control, elderly primigravidae had a relatively healthier lipid

profile and better glycemic control. These findings underline the importance of managing risk factors such as obesity, hypertension, and diabetes in elderly pregnant women, especially those with multiple pregnancies, to minimize the risk of adverse pregnancy outcomes. Further studies with larger sample sizes and long-term follow-up are warranted to explore the full impact of these risk factors on maternal and fetal health.

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