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Investigating the Incidence of Fetal Macrosomia at Georgetown Public Hospital Corporation (GPHC) during the Period January- June 2021

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Fetal macrosomia is a well-researched topic across the world but there is very little research done on this topic in Guyana. This condition impacts the morbidity and mortality of pregnant women significantly and this research paves a way to improve the overall health of women.
Objectives: This study aimed to determine the incidence of fetal macrosomia at GPHC during the study period, to identify the maternal risk factors, the mode of delivery, and the maternal and neonatal outcomes of patients with fetal macrosomia.
Methods: A retrospective cohort study design was conducted. Permission was granted from the relevant personnel and a data collection spreadsheet using Microsoft Office Excel 2007 was created. Data were further analyzed using (***SPSS***®) software version 26.0.
Results: The incidence of fetal macrosomia at GPHC was found to be 4.3%. Male gender was the most common risk factor (62.9%) while post-term accounted for the least (2.6%). It was also found that the majority of mothers (55.2%) delivered via lower segment cesarean section (LSCS) while (44.8%) delivered via vaginal delivery (VD). The majority of macrosomic babies had no

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complications associated with their birth weights (59.1%). However, the least common complication was noted to be humeral fractures (1.6%) in the study population. Birth weights >4000g contributed to the majority of mothers resulting in an LSCS delivery (55.2%). The least common maternal outcomes were 3rd& 4th-degree lacerations (0.9% each).

Conclusion: The incidence of fetal macrosomia in this study was found to be 4.3%. Male sex, advanced maternal age, grand multiparity, the presence of diabetes, and being late and post-term were all significant risk factors associated with this condition.

Keywords: Advanced maternal age; grand multiparity; male sex; diabetes; post term; late term; LSCS; SVD.

1. INTRODUCTION

Women play a fundamental role in the socio-economic development of our society. However, maternal mortality is unacceptably high with about 295, 000 women dying during and following childbirth in 2017. The vast majority of these deaths (94%) occurred in low-resource settings, and most could have been prevented [1]. Similarly, fetal macrosomia is one such condition which is common in obstetrics and has been associated with a significant risk of both morbidity and mortality. Over the years, the trend in fetal macrosomia has been shown to be increasing worldwide [2-4]. Although its prevalence varies among different races and different ethnic groups, it affects approximately 6-10% of all newborns [5, 6].

According to the American College of Obstetrics and Gynecology (ACOG), macrosomia is defined as birth-weight over 4000g irrespective of gestational age or greater than the 90th percentile for gestational age after correcting for neonatal sex and ethnicity [12]. Birth weights >4000g are influenced by a number of risk factors namely, a high pre-pregnancy body mass index (BMI), a higher weight gain during pregnancy, older maternal age, post term pregnancy, and a history of previous macrosomia in addition to male sex, and maternal diabetes [7].

The birth of a macrosomic infant can result in significant maternal and neonatal complications and often times contribute many challenges to the obstetricians. It is associated with maternal complications such as emergency LSCS, postpartum hemorrhage (PPH), perineal trauma and neonatal complications which includes shoulder dystocia, obstetric brachial plexus injury (OBPI), birth fracture of the humerus or clavicle and birth asphyxia [8,9].

Recognizing key risk factors is crucial in taking appropriate prenatal measures to reduce the incidence of fetal macrosomia. Subsequently, this research aims to highlight the incidence of fetal macrosomia, in addition to identifying the risk factors and complications which may arise as a result of this condition. The results of this research can then be used to improve the outcomes of pregnancies and thereby improving the overall health of women.

2. LITERATURE REVIEW

Fetal macrosomia is a common obstetric condition with both maternal and neonatal effects postpartum. Prenatal diagnostic methods used to detect macrosomia are crucial in estimating fetal weights and play a major influence in the management of labor and the mode of delivery. An accurate diagnosis of this condition can only be made retrospectively by measuring the birth weight of the infant after delivery. Currently, there is no definitive consensus for defining macrosomia. ACOG defined macrosomia as birth-weight over 4000g irrespective of gestational age or greater than the 90th percentile for gestational age after correcting for neonatal sex and ethnicity [10].

A birth weight >4000g used to define fetal macrosomia has been supported by many researches [5-12]. In high income countries, the most commonly used threshold is weight above 4500g (9lb 15oz), but weight above 4000g (8lb 13oz) is also commonly used [12]. Babies are called “extremely large” if they are born weighing more than 5,000 grams (11 lbs) [13].

The incidence of fetal macrosomia is approximately 10% [3, 4,6,11]. Contrary to this however, the prevalence of fetal macrosomia in a study of 4,528 deliveries in Balikesir State Hospital, Turkey during the period October 2009 to March 2010, only 2.3% (103) of deliveries were greater than or equal to 4000g [14]. On the other hand, in an institution based cross-sectional study in Ethiopia, consisting of 309

pregnant mothers, the prevalence of macrosomia was significantly high with an incidence of 19.1% [15]. Studies have also shown a baseline decline in incidence rate from 8.84% to 8.07% in a 47yr old research containing a total of 147,331,305 singleton births [16].

Macrosomia is associated with a number of maternal risk factors. These include maternal body mass index (BMI), weight gain, advanced maternal age, previous macrosomic baby, male child sex, ethnicity, multiparity, diabetes, and gestational age [17].

In a cohort study done by (Beta et al., 2019) risk factors indicated above were supported with a higher median maternal age, gestational age, weight and height, a lower incidence of women of South Asian origin and higher incidence of gestational diabetes mellitus compared with neonates with birth weights <4000g in the study [18]. This was further concurred by a 5-year cohort study where 60% of mothers who delivered macrosomic infants were aged 35 years and above. Additionally, there was significant association between macrosomia and diabetes, obesity and multiparity with 712 (39.5%), 1350 (75%) and 81% of women with these characteristics delivering macrosomic neonates. And, similar to the research by (Beta et al., 2019) where the study population were of South Asian origin, approximately fifty-nine (59.5%) of subjects who delivered macrosomic infants were of Arab ethnicity [19].

Contrary to the above studies, a case-controlled study in Tanzania highlighted that the mean maternal age (29.9 years) was not significantly higher than the control group. And, the mean birth weight in the macrosomic group was similar among male and female macrosomic neonates. However, other parameters such as mean parity, weight at delivery, mean height and gestational age at delivery were significantly higher among the neonates with birth weights <4000g [14].

Macrosomia is associated with numerous perinatal and maternal complications. The risks of adverse maternal outcomes increased exponentially with increasing birth weight [18].

Shoulder dystocia, brachial plexus injury, skeletal injuries, meconium aspiration, prenatal asphyxia, hypoglycemia, and fetal death are reported to be associated with macrosomia. Maternal complications of macrosomia include prolonged labor, labor augmentation with oxytocin, cesarean delivery, postpartum hemorrhage, infection, 3^{rd-} and 4th -degree perineal tears, thromboembolic events, and anesthetic accidents. Furthermore, macrosomic infants are at an increased risk of type 2 diabetes mellitus, hypertension, and obesity in adulthood [20]. ACOG emphasizes that an increased risk of LSCS is the primary maternal risk factor associated with macrosomia. Results from cohort studies demonstrate that the risk of LSCS in women attempting a vaginal delivery at least doubles when the fetal weight is estimated to be more than 4,500g [22].

This was also supported by (Beta et al., 2019) where the macrosomia group showed a higher prevalence of all maternal complications, with a 3-fold increased risk of LSCS for failure to progress and an almost 2.5-fold increased risk of severe PPH and OASIS [18]. Conversely, in a study which looked at the trends in the incidence of fetal macrosomia in the United States between 1971-2017, the prevalence of macrosomia and cesarean section was decreased every year from January 2006 to December 2013 [16].

ACOG states that “a prolonged second stage of labor or arrest of descent in the second stage is an indication for LSCS” and that “prophylactic LSCS may be considered … with estimated fetal weights greater than 5,000g in women without diabetes and greater than 4,500 g in women with diabetes” [22]. However, inaccuracy of prenatal clinical or sonographic diagnosis may result in errors of the estimated birth weight and subsequently exposing both mother and fetus to the risk of complications which may arise from an LSCS.

In this retrospective study, the aim was to determine the incidence of fetal macrosomia and to highlight the risk factors and complication which may occur as a result of this condition. The purpose of this study is to increase the knowledge and care preparedness of the obstetric staff in managing macrosomia.

2.1 Goals and Objectives

2.1.1 Goal

To investigate the incidence of fetal macrosomia at GPHC during the period January- June 2021.

2.1.2 Research question

1. What is the incidence of fetal macrosomia at GPHC during the period January- June 2021?
2. What are the maternal risk factors of patients with fetal macrosomia?
3. What are the modes of delivery of patients with fetal macrosomia?
4. What are the maternal and neonatal outcomes of patients with fetal macrosomia?

2.1.3 Objectives

1. To determine the incidence of fetal macrosomia at GPHC during the period January- June 2021
2. To identify the maternal risk factors of patients with fetal macrosomia
3. To identify the mode of delivery of patients with fetal macrosomia
4. To determine the maternal and neonatal outcomes of patients with fetal macrosomia

2.2 Methodology

2.2.1 Study design

1. **Type of study:** This research followed a retrospective cohort study design which aimed at identifying the incidence of fetal macrosomia during the period January- June, 2021 at Guyana's largest and main referral hospital, GPHC.
2. **Research population:** Pregnant women who delivered at GPHC during the study period aforementioned.
3. **Inclusion criteria:**
   - All live, singleton pregnancies delivered at GPHC during January- June, 2021 with neonatal birth weights >4000g were selected as cases
   - Neonates were required to be phenotypically normal and delivered at >28 weeks gestation.
4. **Exclusion criteria:**
   - Medical records which were not in the specified study period
   - Incomplete subject's profile
   - Charts with illegible writing
   - Women with multiple pregnancies
5. **Duration of study:** 6 months

2.2.2 Study protocol

Permission was first sought by the head of the Obstetrics and Gynecology (OBGYN) department as well as the director of the medical records department, GPHC. Once granted, the researcher created a data collection spreadsheet using Microsoft Office Excel 2007 which was used to extract relevant information from patient charts that are specific to the research. Completion of research proposal was followed by application to the Ministry of Health, Institutional Review Board (MoPH IRB). Once permission was obtained, the researcher made a list of all live births with birth weights >4000g during the time period recorded in the Confinement book located in Birthing Room at OBGYN department. This list was used as a guide in identifying charts which were needed in the research. The researcher then made regular visits to the medical records department at GPHC where all maternal and neonatal charts that were present between January to June, 2021 were perused, pulling those names found in the list as well as inspecting the rest of the charts for any that may possibly not be on the list. Majority of maternal charts also included neonatal charts present within and the researcher was able to identify neonates with birth weights >4000g.

However, those which were not were identified in the neonatal charts of patients who were admitted to the Neonatal Intensive Care Unit (NICU) or the Step down Unit (SDU). The predesigned data collection tool was used to input appropriate data from medical records. This tool included patient's demographical information, gravidity and parity, gestation age, risk factors, mode of delivery and the maternal and neonatal complications which may arise due to fetal macrosomia.

Analysis of data was done using (***SPSS***®) software version 26.0 (SPSS Inc., Chicago, USA). The results of this research were compiled and will be presented to the OBGYN Department and other relevant personnel. It is the hope of the researcher that the findings of this study will be a valuable asset in improving the healthcare of pregnant women.

2.2.3 Safety considerations

1. A password protected laptop was used to enter data and same was only known to the researcher
2. Patients' identity remained anonymous as their admission registration numbers were used instead of names

3. Data taken from patient charts was done within the confines of the medical records department, GPHC

2.2.4 Data management and statistical analysis

A retrospective cohort study was conducted for this research using a sample size of all neonates who were delivered at GPHC OBGYN department during January- June, 2021. This was done to ensure an accurate assessment of data for analysis. Data from medical records was entered using Microsoft Office Excel 2007. The data collection tool was divided into five parts for ease of analysis. Namely, demographics, obstetric factors, neonatal factors, risk factors and outcomes were used. Data that has been verified as having no discrepancies were entered into (***SPSS***®) software version 26.0 (SPSS Inc., Chicago, USA) for analysis. Text, table and several charts were used to summarize the results of this research.

2.3 Independent & Dependent Variables

Table 1. Showing the Independent & Dependent Variables

Independent variables	Dependent variables
Age	Birth Weight
Race	Maternal Outcome
Gravidity & Parity	Neonatal Outcome
Gestational Age	
Sex of Neonate	
Risk Factors (Advanced maternal age, male sex, ethnicity, multiparity, gestational age & diabetes)	
Mode of Delivery	

2.4 Quality Assurance

Data which were entered into a predesigned spreadsheet using Microsoft Office Excel 2007 were verified once before proceeding to the next patient chart. Additionally, data inputted into the spreadsheet was done by the researcher only. Guidance was given by consulting with the research supervisor.

3. RESULTS AND DISCUSSION

A total of 2,719 charts were reviewed at GPHC's Medical Records department of which 116 patients met the criteria for this research. As a result, the incidence of fetal macrosomia at GPHC during the period January- June, 2021 was found to be 4.3%. Of this, 3.27% accounted for patients with birth weights between 4000g-4499g. 0.9% of patients had birth weights between 4500g- 4999g and 0.2% of patients were >5000g.

Table 2. Table showing statistical data on the maternal age and birth weights of macrosomic babies delivered at GPHC during the period January- June 2021

		Age	Birth Weight (GRAMS)
N	Valid	116	116
	Missing	0	0
Mean		29.19	4299.62
Median		29.00	4190.00
Mode		26[a]	4015[a]
Minimum		17	4005
Maximum		44	5230

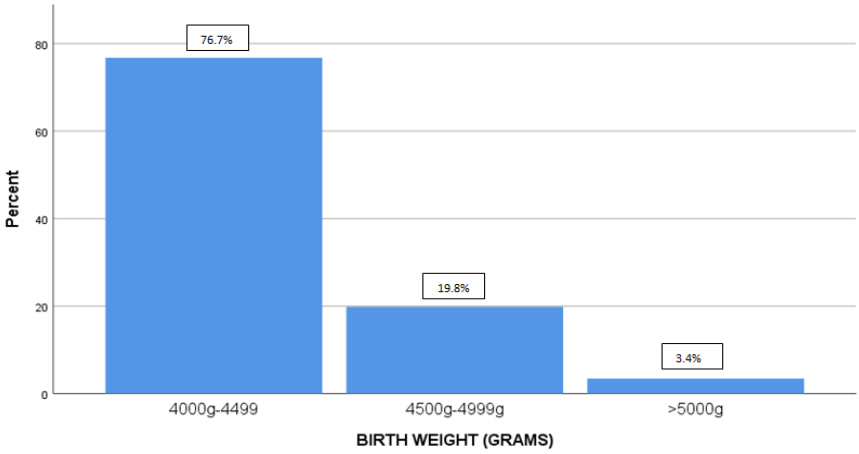

Fig. 1. Bar graph depicting the birth weights (grams) of macrosomic babies born at GPHC during the period January- June, 2021

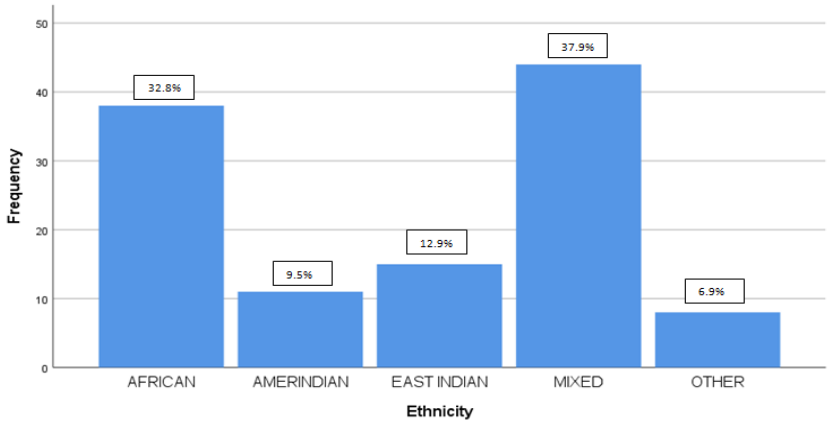

Fig. 2. Bar Graph representing the ethnicity of mothers who delivered macrosomic babies at GPHC during the period January- June, 2021

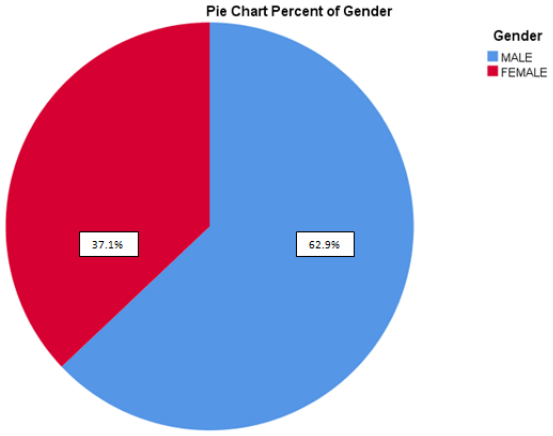

Fig. 3. Pie Chart highlighting the percent of gender of macrosomic babies born to mothers who delivered during January- June, 2021

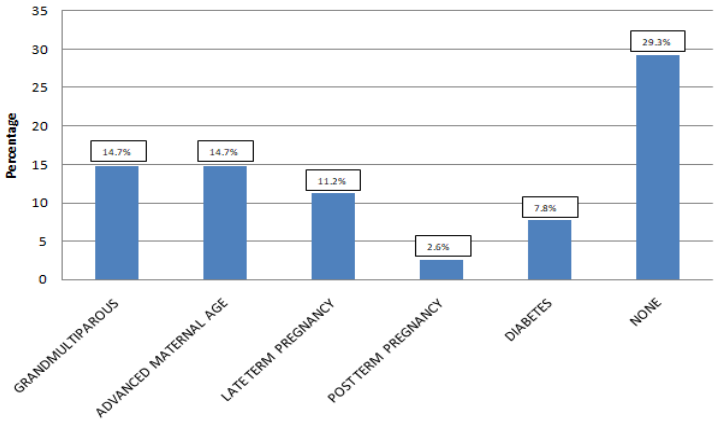

Fig. 4. Bar Graph highlighting the maternal risk factors of fetal macrosomia of women who delivered at GPHC during the period January- June, 2021

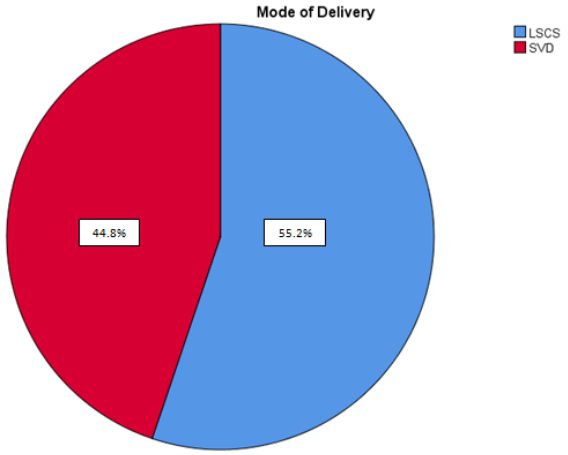

Fig. 5. Pie Chart showing the mode of delivery of mothers who gave birth to macrosomic babies at GPHC during the period January- June, 2021.

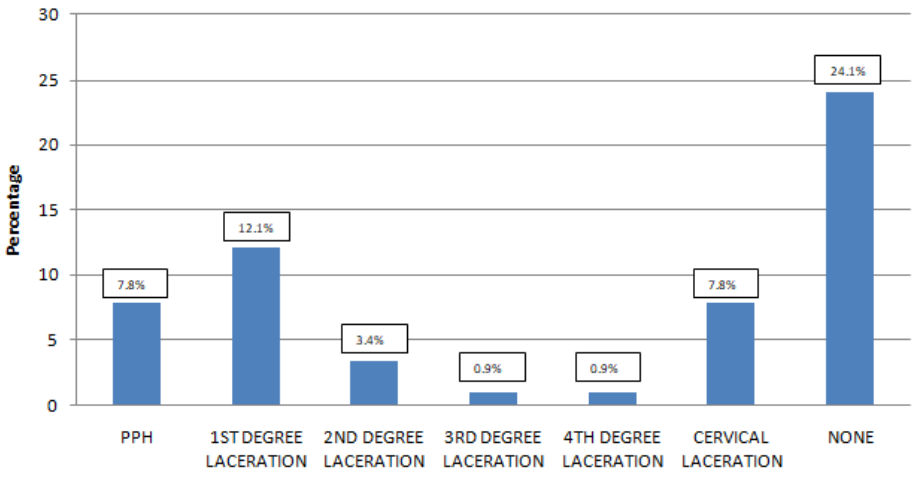

Fig. 6. Bar Graph depicting the maternal outcomes of mothers who delivered macrosomic babies at GPHC during the period January- June, 2021

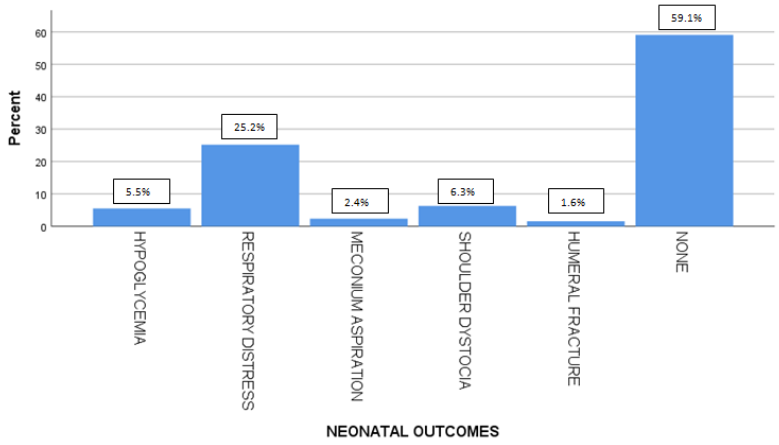

Fig. 7. Bar Graph indicating the neonatal outcomes of macrosomic babies

In this retrospective cohort study conducted at GPHC a total of 2,719 mothers were evaluated during the period January-June, 2021. Overall, 116 patients delivered babies with weights >4000g and therefore acquired an incidence rate of 4.3%. Generally, the incidence of fetal macrosomia in a number of researches conducted within the last 5yrs have indicated an incidence rate between 7.5% to 12.7% [17,18,23,24]. This suggests that the incidence of macrosomic babies born at GPHC during January- June, 2021 is considerably lower when compared to other countries.

Contrary to this, in a case-control study which was conducted at the Muhimbili National Hospital (MNH) maternity and neonatal wards there was an incidence rate of 2.3%.This was noted to be lower than that of GPHC. In this study (Said et al., 2016) attributed this to lower pre-pregnancy weight and low socioeconomic status within their population [14]. Similarly, a cross-sectional study in Ethiopia showed an incidence rate of 19.1%, a contrastingly significant value when compared to that found in this research [15].

Neonates with birth weights between 4000g-4499g accounted for (3.27%) of the incidence rate of these patients, (0.9%) of patients had birth weights between 4500g- 4999g and (0.2%) of patients were >5000g. Similar decline in incidence rates were seen in a cohort study in Iran during the years 2007-2011 with (7.6%), (1.2%) and (0.2%) respectively [19]. This was further emphasized in Fig. 1 where the majority of macrosomic babies (76.7%) were delivered with a birth weight between 4000g-4499g while the minority, accounting for (3.4%) had birth weights >5000g. In Table 2 the mean maternal age in this research is 29.2yrs with a minimal age of 17yrs and maximum of 44yrs. With regards to birth weights, the mean weight is 4,299.6g and a minimal birth weight of 4,015g and maximum of 5,230g.

In Fig. 2, the most common ethnic group was mixed race at (37.9%) and this however was followed closely by mothers of African descent with (32.8%). The least common option was other (6.9%), which was comprised of patients who were Latinos. No mothers of Chinese or Portuguese gave birth to macrosomic babies during the study period. Over the years, Guyana has become more predominantly interracially mixed and is the race most Guyanese identifies with currently. However, studies have found women of Hispanic origin to have a high frequency of macrosomic babies. It is important to recognize (6.9%) of pregnant women in this study were Latinos which is significant as Guyana's population has become more and more diversified with migrants from Venezuela and other Latino countries to Guyana over the years.

Results of this study has revealed that having no risk factors as well as having advanced maternal age, grandmultiparity, African descent and babies who were of male gender were all significant predictors of macrosomia. Fig. 3 indicated that (62.9%) of mothers who delivered macrosomic neonates were of male gender while (37.1%) of macrosomic babies born during this time were females. Generally, males are more likely to be macrosomic since they are approximately 150-200g larger than females of the same gestational age near term [25].

Fig. 4 highlighted other maternal risk factors of fetal macrosomia of women who delivered at GPHC during the period January- June, 2021. A considerably amount of women did not have any risk factors accounting for (29.3%) while women whose gestational age were post term accounted for the least at (2.6%). Advanced maternal age and grandmultiparity attained (14.7%) of women each, late term (11.2%) and diabetes obtained (7.8%). Figs. 2, 3 and 4 were used to describe the risk factors of fetal macrosomia.

In another study, approximately 60% of macrosomic fetuses are born to mothers without identifiable risk factors [26]. This has been supported by the findings of this research where the second most popular option (29.3%) in this bar graph were mothers who had no risk factor for fetal macrosomia. Numerous studies have highlighted maternal age >30yrs as a major risk factor for fetal macrosomia [14,27,28]. Pregnant mothers with this age group were 2.6 times more likely to deliver macrosomic babies when compared to mothers <30 years [15]. According to this research, 14.7% of women who delivered macrosomic babies were of advanced maternal age. Additionally, table 2 emphasized the mean maternal age in this research was 29.2 years.It has been suggested that metabolic changes occur with increasing age. Hormonal and endocrine factors may stimulate higher fetal growth rates among pregnant women who are older [27].

Along with advanced maternal age, another 14.7% of pregnant women who delivered macrosomic babies were grandmultiparous. Parity is a well-recognized predictor of birth weight. Studies have found an association between multiparity and its contribution to diabetes and obesity which are also added predictors of macrosomia [24 29]. Prolonged gestational age contributes to an increase in birth weight as the fetus continues to absorb nutrients from the mother and thereby allowing the growth process to continue in utero [17,30]. In the United States in 2014, the risk of birth weight more than 4,500g increased from 1.3% at 39 weeks of gestation to 40 weeks of gestation and to 2.9% when gestational age exceeds 41weeks [38]. This research has shown that 11.2% of mothers were late term at delivery. Contrastingly, only 2.6% of mothers were post term which may have resulted from antenatal care referrals to GPHC for induction prior to this gestational age and elective LSCS being conducted before this time.

Additionally, multiple studies have also identified maternal diabetes as a significant risk factor of fetal macrosomia. Studies have attributed this to maternal glucose passing through the placenta leading to fetal hyperinsulinemia and fetal hyperglycemia which is responsible for stimulation of the secretion of insulin, insulin-like growth factors, growth hormone, and other growth factors, which in turn stimulate fetal tissue growth, deposition of fat, and glycogen in the fetus, resulting in macrosomia [31]. However, in this research, 7.8% of mothers had this condition. In a study by (Adugna et al., 2020), mothers who were diabetic were 5.5 times more likely to have a macrosomic baby as compared to those who had not.

The identified predictors of fetal macrosomia in this research were male gender, along with advanced maternal age and multiparity. The other risk factors identified were not significantly associated with this condition as compared to those mentioned.

Generally, the overall rate of LSCS in babies with a birth weight >4,000g varies widely between different studies and ranges from 14% to 44% [32]. Fig. 5 also shows that this research has a predominant rate of 55.2% for deliveries via LSCS and 44.8% which occurred via SVD. This was also reflected in a study conducted in Tanzania which indicated an LSCS rate of 61% but the difference however was not found to be significant when compared to controls [14]. This high rate may be contributed to elective LSCS which are conducted and emergency LSCS due to failed inductions. Elective LSCS are performed with the aim of preventing unproductive labor and birth trauma. However, with antenatal assessment done to predict fetal macrosomia, a large number of LSCS would be needed in order to prevent a single bad outcome in pregnancy complicated by macrosomia [33]. However, elective LSCS has been recommended by a research done consisting of 75,979 women who delivered vaginally between 1970-1985. It has been suggested that elective LSCS should be recommended for diabetics with fetal weights greater than or equal to 4250g and trial of vaginal delivery for non-diabetic fetuses with weights greater than or equal to 4000g.Similarly, ACOG has issued its clinical guidelines for fetal macrosomia which indicated that although the diagnosis of fetal macrosomia is imprecise, prophylactic cesarean delivery may be considered for suspected fetal macrosomia with estimated fetal weights of more than 5,000g in

pregnant women without diabetes and more than 4,500g in pregnant women with diabetes. At GPHC, women who are offered an elective LSCS are determined by patient's risk factors including parity and previous history of a macrosomic delivery.

The results of this research suggest increase risk of LSCS and trauma to the birth canal. Birth weights >4000g contributed to the majority of mothers resulting in an LSCS delivery (55.2%) which is shown in Fig. 5. Additionally, in Fig. 6, the bar graph showed that (24.1%) of mothers had no maternal complications while 1st degree laceration and PPH accounted for (12.1%) and (7.8%) respectively. The least common maternal outcomes were 3rd & 4th degree lacerations whereby each accounted for (0.9%). Although a significant (24.1%) of women did not have any maternal outcomes, these were likely women who were multiparous. Trauma to the birth canal which includes 1st to 4th degree lacerations and cervical lacerations as well as PPH were also other maternal complications of macrosomic deliveries. In a study conducted at the Child Hospital, in Qassim Saudi Arabia,maternal complications encountered included perineal tears (1.7%), PPH (1.2%), and cervical lacerations (0.7%) [34]. This was also noted in a case controlled study in Tanzania which found that the commonest complications in mothers delivering macrosomic infants included prolonged labor (27.2 %), 2nd degree perineal tears (22.3 %) and post-partum hemorrhage (PPH) (17.5 %) [14]. Birth canal trauma along with LSCS were contributors of PPH in this research.

Lastly, Fig. 7 indicated that the majority of macrosomic babies (59.1%) had no complications associated with their birth weights. However, a considerable number, (25.2%) of these neonates presented with respiratory distress after birth. The least common complication was noted to be humeral fractures which accounted for only (1.6%) of the study population. Macrosomic babies also presented with other complications such as shoulder dystocia, hypoglycemic episodes and meconium aspiration following delivery with (6.3%), (5.5%) and (2.4%) respectively. Although majority (59.1%) of macrosomic neonates suffered no complications, there were still a considerable 41% with neonatal complications after birth. Similar findings were noted in Tanzania where the commonest neonatal complications among the macrosomic group were hypoglycemia (22.7 %), respiratory distress (16.5 %), birth asphyxia (14.4 %) and birth trauma (14.4 %) [14]. Like this research, a study conducted at Razi Hospital in Ahvaz city, Iran noted a considerable number of neonatal complications developing after birth and the risk of this increased with increasing birth weights [19]. Meconium aspiration and babies born via LSCS in this research may have likely contributed to neonates' respiratory distress, even causing some to be admitted to NICU at GPHC. A retrospective study done in Philadelphia during 2003-2005 attributed its high frequency of respiratory distress to the influence of increase LSCS deliveries and maternal diabetes on lung maturity [35]. Most cases of hypoglycemia occur to neonates born via LSCS and may be due to delay in initiation of feeding [14]. Lastly, there is a 1% chance of shoulder dystocia in newborns with birth weight less than 4000g and about a 5-10% chance for the newborn with a birth weight of 4000g to 4500g [36]. In this research, no fetal or maternal deaths occurred.

It is hoped that the findings of this research enables future researchers to conduct further studies in this area and in so doing aid in the improvement of the health care sector in Guyana.

4. LIMITATIONS

1. **Time**: the time given for this research was limited. The pandemic played a major contributor for this limitation as the researcher was required to balance completion of all duties prior to visiting the medical records, where there was most times limited space to accommodate more than 3-4 researchers at once.
2. **Working Space:** as mentioned, GPHC's medical records department's capacity to accommodate researchers at a time was very poor. If this was already occupied by at least 4 researchers data collection was postponed further until this was obtained.
3. **Illegibility of records**: maternal charts with no documented birth weight were excluded from this research. It has been observed that the majority of these charts were neonates born via LSCS. This may have included neonates who fit the criteria for the research. Additionally, not all charts included pre pregnancy BMI or pregnancy weight gain.
4. **Lack of research**: No prior published data have been found on this topic in Guyana.

This may have contributed significantly in the comparison of results.

5. RECOMMENDATIONS

1. Control of maternal hyperglycemia is crucial in antenatal care and the prevention of macrosomia. Pregnancies complicated by diabetes should be monitored closely and all medical personnel should be trained to manage this at health centres across Guyana as opposed to referring patients to GPHC for further antenatal care.
2. Having ultrasonography available in all regions is an important tool in assessing for fetal macrosomia and can significantly aid in decreasing the feto-maternal morbidity and mortality caused by this condition
3. More time should either be allotted for the completion of this research or enabling researchers to work together will allow for better completion within the given time
4. The medical records department at GPHC should have improved methods of patient information storage, including soft copies of charts. Files should be organized based on patient diagnosis and would greatly aid researchers in quickly identifying charts specific for each research
5. The medical personnel responsible for inputting patient information during the delivery of all babies at GPHC should ensure all charts are completely filled, including birth weights before being handed over to LSCS room, post natal or NICU
6. Further research should be done to include other hospitals within each region of the country to better reflect the incidence of fetal macrosomia in Guyana and to compare the management of this within each region.

6. CONCLUSION

1. The incidence of fetal macrosomia in this study was found to be 4.3%.
2. Male sex, advanced maternal age, grandmultiparity, the presence of diabetes and being late and post term were all significant risk factors associated with this condition.
3. Macrosomic babies were predominantly born via LSCS which was significant when compared to babies born via SVD.
4. LSCS was the major maternal complication while respiratory distress immediately after birth was the major neonatal complication at GPHC.

Therefore, antenatal care is crucial in the early detection and prevention of fetal macrosomia and is important in reducing the morbidity and mortality of this condition.

CONSENT

It is not applicable.

ETHICAL APPROVAL

1. Permission was obtained from the OBGYN department, medical records department and IRB to conduct this research.
2. Patient's registration number were used instead of patient's personal information

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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