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Fetal and Maternal Pregnancy Outcomes in the Presence of Macrosomia: Impact of Prenatal Detection

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Abstract

Introduction: A pregnancy with a macrosomic fetus is a high-risk condition. This research study sought to describe local methods for prenatal identification of macrosomia and to assess the impact of prenatal detection of macrosomia on neonatal and maternal pregnancy outcomes. **Methods:** Retrospective one-year file audit of pregnancies with delivery of a macrosomic baby born between 01/01/2022 and 31/12/2022 at New Somerset Hospital, Cape Town. This study assessed the health profile of pregnant women, including risk factors, clinical investigations, method of delivery, timing of delivery, and occurrence of neonatal and maternal complications. This research study was approved by the University of Cape Town Health Research Ethics Committee and the Western Cape Government, Department of Health. **Results:** Macrosomia occurred in 268/5855 (4.6%) of deliveries. Prenatal detection rate was 54.1%. SFH was more widely used (95.1%) compared to ultrasound (80.9%), although detection rates for macrosomia were higher with USS (45.6% vs 38%). Detection was influenced by maternal rather than fetal factors, e.g., IGT/GDM ($p = 0.02$), high BMI ≥ 30 ($p = 0.01$), previous CS ($p = 0.027$), previous macrosomia ($p = 0.004$), and EGA ≥ 40 weeks ($p = 0.026$). Most deliveries (84.3%) occurred in the 39 - 41 week range. Maternal complications occurred with 125 (46.6%) mothers, of which 68 (54.4%) were pregnancies with prenatal detection of macrosomia. The composite adverse maternal peripartum outcome occurred in 68/145 (46.9%) [Odds ratio 1.01, confidence interval (95% CI) 0.8 to 1.3] with prenatally detected macrosomia, versus 57/123 (46.3%) [OR 0.99, 95% CI 0.8 to 1.2] in the undetected group. The crude relative risk was 1.02 (95% CI 0.6 to 1.7). Shoulder dystocia occurred equally between the detection groups. Fetal complications occurred in 129 (48.1%) pregnancies, of which macrosomia was prenatally detected in 76 (58.9%). NICU admission rate was 13.1%. The composite adverse fetal perinatal outcome occurred in 52.4% in-

fants [Odds ratio 1.2, 95% CI 0.9 to 1.6] for detected pregnancies versus 53/123 (43.1%) [OR 0.8, 95% CI 0.7 to 1.1] undetected. **Conclusion:** Prenatal detection occurred in about half of the study cases, with USS showing a higher detection rate than SFH monitoring. Composite maternal and fetal adverse outcomes were broadly similar between detected and undetected groups, although detected pregnancies appeared to undergo more intervention. Prenatal risk assessment questionnaires, diligent SFH monitoring, and selective third-trimester USS surveillance for high-risk pregnancies are expected to enhance diagnostic accuracy and resource optimization, particularly for low-resource settings. Individualization of delivery interventions by pregnancy risk factors, previous obstetric history, and personal preferences is supported.

Keywords

Postpartum Depression, Prevalence, EDPS, Buea Health District, Cameroon

1. Introduction

Birth weight is a fundamental determining factor of the survival of a newborn infant. Fetal macrosomia is an obstetric condition in which the fetus is larger than average. Macrosomia puts mothers and babies at higher risk of negative pregnancy outcomes. Hence, pregnancies affected by macrosomia are classified as high-risk. The known adverse fetal-maternal outcomes attributed to macrosomia include risks of obstetric anal sphincter injury (OASI), postpartum hemorrhage, emergency caesarean, shoulder dystocia, brachial plexus injury, bone fractures, stillbirth, birth asphyxia, meconium aspiration, and metabolic disorders. The incidence of macrosomia is reported to be increasing. Previous South African studies reported low macrosomia prevalence rates of 1.9% to 3.4% [1] [2].

The correct assessment of birthweight before labor and the capacity to recognize fetuses at risk of complications are challenging. Researchers largely agree that fetal macrosomia can be identified antenatally if specific evaluation is done based on clinical suspicion. When fetal macrosomia is not recognized timeously, delivery may be more difficult to manage, which often leads to patient morbidity, financial and medico-legal implications [3]. The evidence for perinatal complications in pregnancies with fetal macrosomia comes mostly from cross-sectional studies of diabetic mothers addressing the safety and efficacy outcome of caesarean section (CS) delivery and induction of labor in well-resourced settings [4]. Few researchers have evaluated the role of clinical assessment for antenatal identification of fetal macrosomia, a practice now generally limited to low-resource settings [5]. There are very few discussions about adjusting for confounders, such as hospital resources, ultrasonographic service availability, intra-operative complications such as hemorrhage, and surgical skill factors. This current study assessed the role of risk factor identification, clinical and sonographic assessment, on the prenatal identification of fetal macrosomia. The researchers also evaluated the im-

pact of pre-delivery detection of macrosomia on fetal and maternal pregnancy outcomes.

2. Methods

This single-institution retrospective descriptive study of pregnancies affected by fetal macrosomia was conducted over a one-year period at New Somerset Hospital (NSH) in Cape Town, South Africa. The researchers used existing data from hospital medical records and employed convenience sampling of all macrosomic newborns delivered consecutively from 01/01/2022 to 31/12/2022. Macrosomic births were defined as a birthweight ≥ 4000 g. Detailed maternal, neonatal, clinical, and demographic information, as well as laboratory investigations, were collected. The newborn data up to discharge or death were also collected.

The study population was allocated into two groups: 1) fetal macrosomia identified during the prenatal period, and 2) fetal macrosomia noted post-delivery. We assessed the clinical history, examination findings, and ultrasonographic weight estimates documented during the pregnancy. The study population risk factors for fetal macrosomia, such as impaired glucose tolerance, high body mass index (BMI), family history of diabetes mellitus, gestational diabetes in a previous pregnancy, and weight gain in pregnancy, were assessed. The timing of delivery, mode of delivery, indications for caesarean section (CS), and fetal-maternal complications of fetal macrosomia were described.

This study employed IBM® SPSS® Statistics (v25.0) to analyze fetal macrosomia, comparing prenatally identified versus undetected cases using Pearson's Chi-Square Test or Fisher's exact test for categorical data and independent-samples t-tests for continuous data. Risk metrics, specifically Crude Relative Risk (RR) and Odds Ratios (OR) from binary logistic regression, were used to estimate feto-maternal complication odds, with 95% confidence intervals used to assess significance. The analyses were unadjusted. A p-value < 0.05 was regarded as statistically significant. This research study was approved by the University of Cape Town Health Research Ethics Committee and the Western Cape Government, Department of Health.

Prenatal detection was defined as macrosomia established during antenatal follow-up using non-invasive methods. The symphysis-fundal height (SFH) was the distance in centimetres from the pubic bone to the top of the uterus. Macrosomia was established by a SFH value plotting above the 90th centile on a SFH chart. Ultrasound EFW macrosomia cutoff was an Estimated Fetal Weight (EFW) ≥ 4000 g or above the 90th percentile for gestational age. Timing of the last assessment was in the third trimester, up to pre-delivery. Either method alone classified a pregnancy as "detected".

3. Results

A macrosomia incidence of 268/5855 (4.6%) was identified. The mean (SD) EGA at birth of 266/268 (99%) pregnancies was 40.0 ± 1.2 (range: 37 - 45) weeks. Two deliveries were at unknown gestational age due to un-booked pregnancies pre-

senting in advanced labor. The number of monthly macrosomic births ranged from 17 to 30 macrosomic births per month, with a bimodal annual distribution trend as shown in Figure 1.

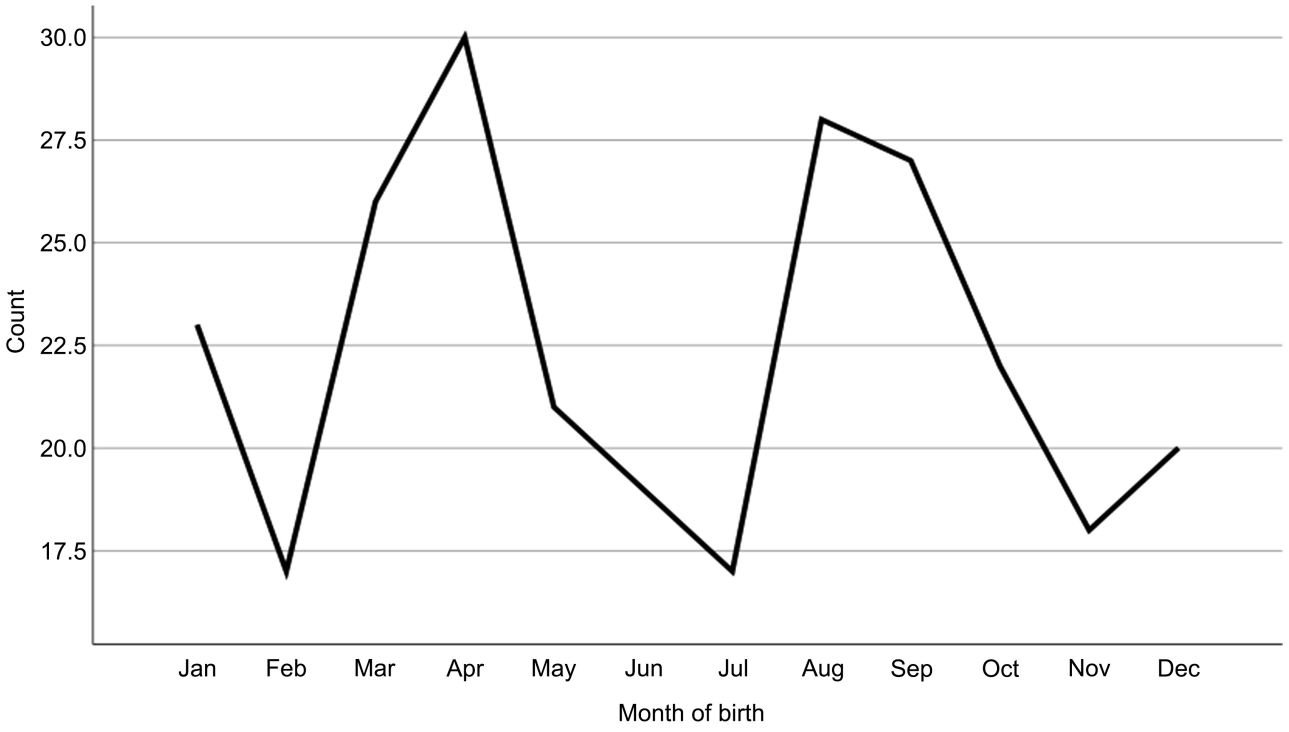

Figure 1. Monthly distribution of macrosomic births for New Somerset Hospital in 2022.

3.1. Prenatal Detection of Fetal Macrosomia Results

Prenatal detection of fetal macrosomia was 145/268 (54.1%). A third-trimester ultrasound scan (USS) was conducted on 217/268 (80.9%) mothers, while a higher number of mothers, 255/268 (95.1%), received SFH monitoring. The identification of macrosomia was either by SFH monitoring only 46/145 (31.7%), ultrasound scan assessment only 48/145 (33.1%), or confirmed by both methods 51/145 (35.2%). USS assessment had a higher macrosomia detection rate of 99/217 (45.6%) compared to SFH monitoring 97/255 (38%) ($p < 0.001$).

3.2. Labor and Delivery

Most pregnancies affected by macrosomia, 152/268 (56%), experienced spontaneous labor as shown in Figure 2. Macrosomia was undetected in 80/152 (52.6%) of mothers who went into spontaneous labor. Emergency caesarean (EMCS) was done for 87/138 (63.0%) of abdominal deliveries, compared to only 51/138 (37%) elective CS deliveries. An elective caesarean section was done for 51/268 (18.7%) of mothers, and 65/268 (24.3%) mothers underwent induction of labor (IOL). A sizable number of IOLs performed 29/65 (44.6%) were eventually delivered via emergency caesarean section (EMCS). A comparative number of mothers had CS delivery, 138/268 (51.5%), contrasted to 130/268 (48.5%) who had vaginal deliv-

eries. Most vaginal deliveries had undiagnosed macrosomia 75/130 (57.7%), while most abdominal deliveries had identified macrosomia pre-delivery 90/138 (65.2%). The risk of CS was particularly high for primiparous mothers, 45/78 (57.7%). The occurrence of labor in macrosomic fetuses was statistically significant ($p < 0.001$).

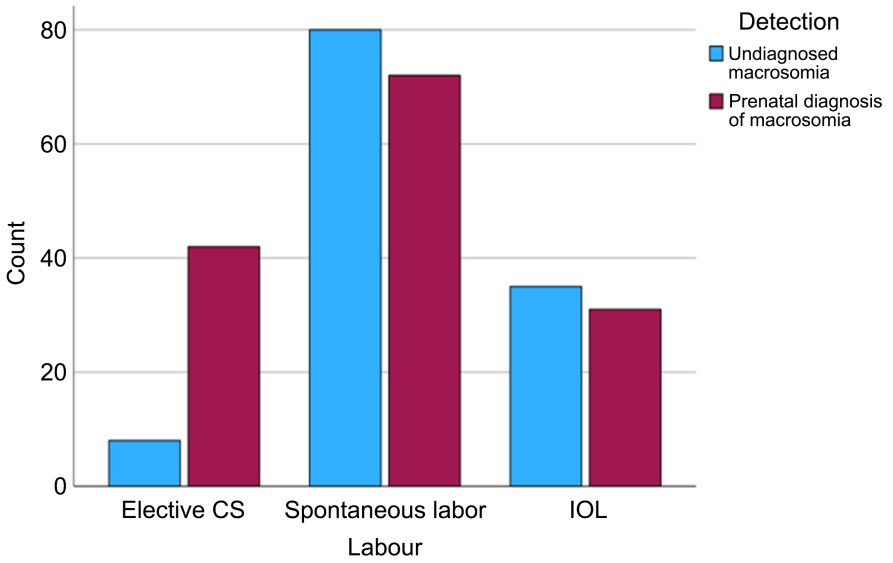

Figure 2. Fetal macrosomia and labor initiation.

Emergency caesarean (EMCS) was done for 87/138 (63.0%) compared to only 51/138 (37%) elective CS deliveries. Assisted delivery with forceps 5/268 (1.9%) and vacuum extraction 10/268 (3.7%) was reported. 12/15 (80%) of deliveries with assisted vaginal delivery were not detected prenatally. Vaginal episiotomy was performed in 28/130 (21.5%) of vaginal deliveries. The effect of identification of fetal macrosomia on the mode of delivery was statistically significant ($p = 0.001$).

3.3. Clinical Risk Factors for Fetal Macrosomia

Detection was influenced by maternal rather than fetal factors such as IGT/GDM ($p = 0.02$), high BMI (≥30, $p = 0.01$), previous CS ($p = 0.027$), previous macrosomia ($p = 0.004$), and EGA ≥ 40 weeks ($p = 0.026$).

3.4. Maternal Complications

Maternal complications occurred with 125 (46.6%) mothers, of which 68 (54.4%) were identified as macrosomic pregnancies, as shown in Table 1. Shoulder dystocia occurred equally between the detection groups. The most frequent complications were perineal trauma 77/268 (28.7%), prolonged labor 41/268 (15.3%), postpartum hemorrhage (PPH) 24/268 (8.9%), and shoulder dystocia 14/268 (5.2%). Perineal trauma included perineal tears 49/268 (18.3%) and episiotomy 28/268 (9.7%). None of the mothers experienced grade 3 or 4 (OASIS) perineal tears. The exclusion of perineal trauma in the analysis for maternal peripartum complica-

tions did not change the trend in maternal complications. The composite adverse maternal peripartum outcome occurred in 68/145 (46.9%) [Odds ratio 1.01, confidence interval (95% CI) 0.8 to 1.3] mothers with prenatally detected macrosomia versus 57/123 (46.3%) [OR 0.99, 95% CI 0.8 to 1.2] in the undetected group. The crude relative risk was 1.02 (95% CI 0.6 to 1.7).

Table 1. Maternal obstetric condition at delivery.

Obstetric Condition at Delivery	Number of Unidentified Cases (%)	Number of Identified Controls (%)	Total (%)	p-Value
IGT/GDM	8/30 (26.7%)	22/30 (73.3%)	30/268 (11.2%)	**0.02**
Previous CS	15/42 (35.7%)	27/42 (64.3%)	42/268 (15.7%)	**0.027**
Multiparous	97/205 (47.3%)	108/205 (52.7%)	205/268 (76.5%)	0.4
Hypertension	11/23 (47.8%)	12/23 (52.2%)	23/268 (8.6%)	0.85
Family History of DM	25/51 (49%)	26/51 (51%)	51/268 (19%)	0.62
Previous Macrosomia	13/48 (27%)	35/48 (72.9%)	48/268 (17.9%)	**0.004**
High BMI	61/156 (39.1%)	95/156 (60.9%)	156/268 (58.2%)	**0.01**
Excessive Weight Gain	38/90 (42.2%)	52/90 (57.8%)	90/268 (33.6%)	0.23
Anemia	16/33 (48.5%)	17/33 (51.5%)	33/268 (12.4%)	0.57
AMA	28/54 (51.9%)	26/54 (48.1%)	54/268 (20.1%)	0.33
Teenager	9/16 (56.3%)	7/16 (43.7%)	16/268 (6%)	0.39
Un-Booked	3/3 (100%)	0/3 (0%)	3/268 (1.1%)	0.17
Late Booker	39/85 (45.9%)	46/85 (54.1%)	85/268 (31.7%)	0.17

3.5. Fetal Outcomes

One stillbirth was observed. Most fetal complications were comparable between the detection groups, as shown in Table 2, although neonatal sepsis and NICU admission occurred more frequently with the detected group. There was no statistical difference noted for the occurrence of adverse neonatal outcomes across different gestational ages, although a tendency for increased frequency at full and late term was observed. Fetal complications were more common after 39 weeks. Early-term (<38 weeks) and extremely late pregnancies (>42 weeks) had low counts overall, making trends less clear.

Table 3 shows the trend in maternal and fetal complications by gestational age at delivery. Few deliveries occurred at early-term between 37^{+0} to 38^{+6} weeks, and tended towards slightly more infants with complications, which suggests that infants might be more vulnerable before full term. 39 weeks showed a high number of healthy mothers but a notable rise in fetal complications. Likely the most physiologically optimal time for delivery.

Table 2. Neonatal perinatal outcomes.

Neonatal Outcomes	Macrosomia Undetected Cases (%)	Macrosomia Detected Controls (%)	p-Value
Low Apgar Scores	13 (10.6%)	12 (8.3%)	0.53
Ventilatory Support	10 (8.1%)	13 (9.0%)	0.42
Perinatal Asphyxia	2 (1.6%)	0	0.123
Birth Trauma	6 (4.9%)	2 (1.4%)	0.09
Neonatal Sepsis	0 (0)	6 (4.1%)	**0.02**
NICU Admission	6 (4.9%)	29 (20%)	**<0.001**
Neonatal Hypoglycemia	40 (32.5%)	54 (37.2%)	0.84
Jaundice	3 (2.4%)	3 (2.1%)	0.96

Table 3. Summary of trends in maternal vs fetal complications by gestational age (EGA).

EGA (Weeks)	Maternal Complications	Fetal Complications	Interpretation
37	A few cases, slightly more without complications	Few total cases, slightly more with complications	Early-term births are uncommon and have mixed outcomes
38	Moderate, mostly without complications	Low overall, skewed toward complications	Relatively safe for the mother
39	High number without complications, some with	Substantial number with complications	Good for mothers, riskier for infants
40	Noticeable increase in complications	Fewer complications for the fetus	✅Safer for baby ⚠Risky for mother
41	✅Peak of no complications	⚠Peak complications	✅Mixed outcomes for mom and baby
≥42	Very few, some with complications	Very few, some with complications	Post-term risks are evident, but the numbers are too small to draw strong conclusions

4. Discussion

The current study identified a 4,6% local macrosomia incidence. Other South African institutional studies reported low rates of macrosomia, ranging from 1.9% to 3.4% [1] [2] [6]. A systematic review of macrosomia prevalence across various countries found a global incidence ranging from 3% to 15% [7]. The disparity compared to other African studies [8] reporting higher incidence rates could be due to the study setting being a level two hospital rather than a tertiary hospital, hence fewer high-risk pregnancies delivered.

4.1. Prenatal Detection of Fetal Macrosomia

Prenatal identification of macrosomia was made for 54.1% deliveries. SFH was more widely used (95.1% of mothers) compared to ultrasound (80.9%). Ultrasound had a higher detection rate, although both approaches—third-trimester USS examination and clinical SFH measurements—were not very effective at detecting macrosomia. A 2018 Cape Town-based study reported a USS sensitivity of 58.3% (CI: 36% - 82%) for detecting macrosomia, with a specificity of 96.5% (CI: 93% - 99%) [9]. The current study aligns with this trend, with a USS detection rate of 45.6% for macrosomia. Other studies have shown similar findings, designating USS as the gold standard for prenatal macrosomia detection. SFH monitoring detected macrosomia in 38% of cases. This finding is consistent with other studies where SFH has been reported to have a low detection rate of about 30% - 50% for macrosomia [10]. The poor detection using SFH is likely due to the measurement being affected by factors such as maternal body size, fetal position, amniotic fluid volume, and uterine abnormalities. Combining SFH with USS is expected to offer a more comprehensive approach to prenatal care. This aligns with findings from other studies, which suggest that using multiple methods improves overall detection rates. This current study found that the difference in detection rates between USS and SFH monitoring was statistically significant ($p < 0.001$), reinforcing the idea that USS is a superior method for prenatal detection of macrosomia.

4.1.1. Timing of Delivery

The prenatal detection of fetal macrosomia plays a significant role in determining the mode and timing of delivery. All deliveries for this study occurred after 37 weeks' gestation, with many deliveries (84.3%) taking place at 39 - 41 weeks, which aligns with the typical pattern observed in other studies. Macrosomia was associated with post-term pregnancies (≥40 weeks), as 67% of births for this study occurred at or beyond 40 weeks. The higher rate of macrosomia among post-term deliveries was consistent with other literature, which has reported that infants born after 40 weeks of gestation had an increased risk of macrosomia, likely due to continued fetal growth and increased placental transfer of nutrients, especially with co-morbidities such as maternal obesity or diabetes [8]. The tendency for macrosomic infants to be delivered post-term is particularly significant in obstetric practice, as post-term pregnancies are known to carry higher risks, both for the baby (e.g., shoulder dystocia, birth trauma, and caesarean delivery) and for the mother (e.g., raised risk of pre-eclampsia and labor complications). The absence of macrosomic births before 37 weeks supports the understanding that macrosomia is primarily a condition of term or post-term pregnancies. Preterm macrosomia is rare, and when it does occur, it is often associated with underlying medical conditions, such as maternal diabetes or other metabolic disorders that may trigger early excessive fetal growth.

The timing of delivery for macrosomic infants is a critical area of obstetric management. The decision to induce labor or to opt for elective caesarean delivery,

especially in post-term pregnancies, is an area of ongoing debate. Some studies have suggested that elective IOL at 39 weeks for suspected macrosomia can reduce the risks of complications like shoulder dystocia without increasing caesarean section rates. However, others have highlighted that waiting for spontaneous labor, particularly for mothers without other risk factors such as gestational diabetes, might be appropriate, as macrosomia alone is not always an indicator of the need for early delivery. The data from the current study showed that most deliveries of macrosomic infants (84.3%) occurred in the 39 - 41 weeks range, with 56% experiencing spontaneous labor, likely indicating that the detected pregnancies were managed expectantly. Most deliveries in this study population were performed post-dates, and this also raises important questions about the pregnancy management and whether earlier interventions, like induction or planned caesarean delivery, could have reduced the risks associated with post-term macrosomia.

4.1.2. Mode of Delivery

The optimal mode of delivery for suspected macrosomic pregnancies remains a controversial topic, with no clear consensus regarding best practice. The 2021 National Institute for Health and Care Excellence (NICE) guidelines recommend a shared decision-making approach, whereby women and their partners are counseled on the potential benefits and risks of the available management options, including elective lower-segment caesarean section (ELCS), induction of labor (IOL), and expectant management [11] [12]. While the Royal College of Obstetricians and Gynecologists (RCOG) recommends offering ELCS to women with diabetes when the estimated fetal weight (EFW) is ≥4.5 kg because of the increased risk of shoulder dystocia and birth trauma, there is currently no consensus regarding the EFW threshold at which ELCS should be recommended for non-diabetic women [13]. Consequently, management in this population remains individualized, considering clinical factors, maternal preferences, and the limitations of fetal weight estimation. For the current study, the incidence of vaginal episiotomy (21.5%), instrumental delivery (11.5%), and CS (51.5%) was high. A sizable number (11.5%) of vaginal deliveries involved assisted delivery methods (forceps or vacuum extraction), with a majority (80%) of those cases having undetected macrosomia. The high incidence of CS for this current study was consistent with global reports from several researchers in diverse ethnic groups.

Of the 268 deliveries, 51.5% were caesarean deliveries, and 65.2% of CS had identified macrosomia before delivery. This study observed that 18.7% of mothers underwent an ELCS in the context of macrosomia. Elective caesareans for macrosomia are often performed based on the results of ultrasound and clinical assessments, with a preference for caesarean delivery in cases where the estimated fetal weight (EFW) exceeded 4500 g. Scheduled ELCS are generally recommended for presumed birth weight > 4000 g in diabetic mothers and a variable range of 4000 g to >4500 g, depending on the setting for women without diabetes. Nevertheless, this strategy remains contentious because there are no RCTs providing conclusive evidence for non-diabetics. Other researchers have cautioned on the importance

of balancing the risks of CS with the benefits of avoiding birth injuries. Thus, while ELCS are common, the optimal approach remains debated. For this current study, macrosomia when detected prenatally had an increased tendency to be delivered via CS.

Out of the total study population of 268 mothers, 65 (24.3%) underwent IOL. Of these, 49.2% (32/65) had macrosomia detected before IOL, while the remaining 51.8% (33/65) were not identified predelivery. Inducing labor at 40 weeks of gestation may be driven by concerns for challenges, including shoulder dystocia, prolonged labor, and birth trauma. In this study, the induction at full term was consistent with international guidelines, which typically recommend waiting until 39 weeks unless there are specific maternal or fetal indications. Researchers have suggested that early IOL for suspected macrosomia could result in a reduced likelihood of CS. For this study, 44.6% of induced labors resulted in CS.

4.2. Maternal Pregnancy Outcomes

Most mothers (91.8%) received routine obstetric care during their hospitalization. Women with macrosomic pregnancies are at higher risk of pregnancy complications such as hypertensive disorders and eclampsia [14], especially if macrosomia was not detected early and when these conditions are not diagnosed or managed appropriately during pregnancy. For the current study, maternal complications were generally similar between the detection groups. Prolonged labor and postpartum hemorrhage were more frequent in the detected group, with 61% of prolonged labor cases and 62.5% of PPH. Perineal tears occurred more often (55.8%) among the undetected group. The finding that perineal trauma occurred frequently with macrosomia aligns with existing literature. Remarkably, for the current study population, no OASIS injury was noted for any of the deliveries.

4.3. Analysis of Fetal Outcomes

Although shoulder dystocia occurred equally between detection groups, fewer fetal complications 4/7 (57.1%) were observed among those with detected macrosomia compared to undetected pregnancies 6/7 (85.7%). Macrosomic infants born after 39 weeks had an increased risk of birth-related injuries. The numbers for this study were, however, too small to draw strong conclusions. The big baby trial showed similar findings of a significant reduction in shoulder dystocia in their per-protocol analysis for pregnancies with IOL between 38^{+0} weeks' and 38^{+4} weeks' gestation compared with deliveries after 38^{+4} weeks' gestation. The big baby trial, however, reported that, in their intention-to-treat analysis, the incidence of shoulder dystocia did not differ clinically between trial groups [14].

Hypoglycemia was observed in 35.1% infants, with 20% of NICU admissions attributed to hypoglycemia. The incidence of hypoglycemia was highest among babies whose mothers had IGT/GDM 13/22 (59.1%). These infants required glucose monitoring and guaranteed feeds to stabilize blood sugar levels. While most of the cases were managed with non-invasive approaches, the frequent monitoring and

additional feeding support highlighted the metabolic vulnerabilities of these infants.

Deliveries at 41 - 43 weeks showed an increased trend of complications for both mother and infant. This suggests that post-term pregnancies are at increased risk, especially for fetal complications. The findings of this study correlate with the recent big baby trial, which sought to guide clinicians on the timing and mode of delivery for pregnancies affected by macrosomia. The researchers reported a significant reduction in shoulder dystocia when macrosomic pregnancies were induced between 38^{+0} weeks' gestation and 38^{+4} weeks' gestation compared to the standard care group [15]. Early delivery by 40 weeks of gestation is expected to lessen the risk of peripartum complications compared to expectant management for pregnancies affected by macrosomia. Early term delivery before 39 weeks was, however, not shown to be of benefit in this study.

5. Conclusions

This retrospective file audit examined prenatal identification of fetal macrosomia and the associated maternal and neonatal outcomes. Prenatal detection occurred in about half of the cases, and USS showed a higher detection rate than SFH monitoring for this macrosomia cohort based at New-Somerset hospital. Composite maternal and fetal adverse outcomes were broadly similar between detected and undetected groups, although detected pregnancies appeared to undergo more intervention.

Findings highlight important information for clinicians and women with suspected macrosomic pregnancies to use when discussing choices and making decisions on timing and mode of delivery. Individualized care plans are recommended, with cutoffs aimed at informing the conversation among the obstetrician, the pregnant woman, and her partner. A prenatal delivery plan discussion needs to consider each woman's specific situation, including her current health status, previous deliveries, other medical co-morbidities, and personal preferences. Many vaginal deliveries in this study did not encounter significant complications; hence, recommendations for ELCS should ideally be for women with increased risk of complications during vaginal birth, such as previous shoulder dystocia and previous caesarean section. Confounding by risk factors limited the interpretation of findings, as detected pregnancies were also more likely to have IGT/GDM, high BMI, previous CS, previous macrosomia, and later gestational age. This may impact the interpretation of intervention rates and NICU admissions. This study did not have sufficient evidence to identify a threshold of gestational age that should prompt ELCS or IOL, although delivery at 39 - 40 weeks appeared to be most optimal. Overall, these findings illustrate the complexity of managing pregnancies affected by macrosomia and underscore the need for individualized and consultative care strategies to optimize maternal and neonatal outcomes.

6. Recommendations

The 4.6% macrosomia incidence rate reinforces the significance of macrosomia as

a rising obstetric concern. Ongoing research is needed to update information on the national prevalence of macrosomia and to identify vulnerable groups. The prenatal macrosomia detection rate of 54.1% was low; hence, efforts to enhance diagnostic accuracy are needed, such as staff training and resource optimization. The researchers recommend selective third-trimester pre-delivery USS surveillance for suspected macrosomia or high-risk pregnancies. The monthly variability in macrosomic births suggests that fluctuations in macrosomia rates may be influenced by a variety of maternal and environmental factors [16]. Future research could explore these variations in more detail, particularly examining the role of factors like maternal obesity, nutrition, and socio-demographic factors on the incidence of macrosomia. Additionally, more research is required to understand the synergistic effects that macrosomia may have on shoulder dystocia and associated fetal peripartum complications [15]. The researcher calls for a RCT to definitively determine the best local management strategy for macrosomic pregnancies, particularly for non-diabetic women. A prospective study could incorporate threshold analysis or a stratified outcome comparison, which would directly support EFW Threshold setting and delivery timing for macrosomia delivery intervention in the local setting. This recommendation is based on the current lack of universal consensus as well as divergent local opinions. The study noted a need for more conclusive evidence on the risks versus benefits of different delivery interventions.

7. Implications for Delivery Planning and Neonatal Care

1) Diligent SFH monitoring using a measuring tape combined with a risk assessment questionnaire for all women [10].

2) Skills training for local staff to conduct third-trimester USS assessment for women identified to be at risk for macrosomia [17].

3) Individualized risk assessment: clinical decisions should be personalized, incorporating maternal history, fetal health, and obstetric risk [18].

4) Educate patients: Expectant mothers should be informed of the risks of going post-term and the benefits of delivering around full term (39 - 40 weeks) [18].

5) Consider ELCS before 40 weeks for macrosomic pregnancies complicated by previous CS delivery, previous shoulder dystocia, and diabetes mellitus [19] [20].

6) Develop guidelines for macrosomia IOL: Based on the increased risk observed at ≥40 weeks, healthcare providers should consider inducing labor by 40 weeks, especially if additional risk factors are present [21] [22].

7) Neonatal care teams need to be ready to provide immediate support to all macrosomic infants, regardless of the mode of delivery [23] [24].

Author Contributions

T.G. and A.F. conceived and designed the study. T.G. performed the data analysis and wrote the first draft of the manuscript. A.F. and G.P. reviewed the analysis, critically revised the draft, and contributed to the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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