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Prevalence of Erb's Palsy due to Shoulder Dystocia in Multan

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Abstract

Background: This study aims to provide a systematic review of scientific literature on the prevalence of Erb's Palsy in shoulder dystocia. Shoulder dystocia is defined as an impaction of the anterior shoulder against the maternal symphysis pubis after the fetus has birthed, and occurs when the breadth of shoulder exceeds the diameter of the pelvic inlet.

Purpose of the study: The object of the study was to determine the frequency of Erb's Palsy in shoulder dystocia and develop some guidelines to reduce the risk of Erb's Palsy in new-born babies.

Methodology: This was a cross-sectional study. Data was collected in Bakhtawar Amin Hospital and Children Hospital, Multan. Non-Probability purposive sampling technique was used to collect the data. The sample size was 62.

Results: The frequency of shoulder dystocia was highest in 30 years of age group which was 17.7% & was lowest in 35 years of age group which was 3.2%. 61.3% of cases have a breech presentation with shoulder dystocia & 38.7% shoulder dystocia cases had vertex presentation. The relation between shoulder dystocia and C-section was significant. 4.8% of cases with shoulder dystocia had C-section and 95.2% cases had normal vaginal delivery. 14.5% of the shoulder dystocia cases had no significant disease. The relation between Shoulder dystocia and obesity was very significant. 45.2% cases had maternal obesity followed by hypertension and viral infection with percentages 33.9% and 6.5% respectively. 14.5% of shoulder dystocia cases had no significant complication during pregnancy. 53.2% Shoulder dystocia cases had pre-eclampsia is a complication that is very significant followed by lowest complication placenta previa having 9.7% cases. 22.6% of cases had gestational diabetes as well. The relation between overweight and shoulder dystocia was significant having 79% cases. Interestingly our study shows that 21% of cases had normal fetal weight. The relation between overweight & shoulder dystocia was significant having 79% cases. Interestingly our study shows that 21% of cases had normal fetal weight.

Conclusion: Our study indicates that 82.3% cases of shoulder Dystocia had Erb's palsy that is alarming situation.)

Keywords: Shoulder dystocia; Erb's palsy; Prevalence

Introduction

This study aims to provide a systematic review of scientific literature on the prevalence of Erb's Palsy in shoulder dystocia. The objective of this literature is to propose evidence-based key messages to diagnose who suffer from Erb's palsy due to shoulder dystocia.

The shoulder joint or glenohumeral is structurally classified as a synovial ball and socket joint and functionally as a Diarthrosis and multi-axial joint. It involves articulation between the glenoid cavity of the scapula (shoulder blade) and the head of the humerus (upper arm bone). The shoulder joint is the junction between the chest and the upper extremity [1]. Two joints are at the shoulder. The glenohumeral joint is the ball-and-socket junction of the top of the arm bone, and the socket of the shoulder blade. A second joint in the shoulder is the junction of the collar bone with the shoulder blade, called the acromioclavicular joint. Most shoulder motion occurs at the ball-and-socket glenohumeral joint, but for full motion of the shoulder, the acromioclavicular joint must also be functioning normally [2].

The shoulder joint is a muscle-dependent joint as it lacks strong ligaments. The primary stabilizers of the shoulder include the biceps brachii present on the anterior side of the arm, and tendons of the rotator cuff; which include:

- Supraspinatus
- Infraspinatus
- Teres Minor
- Subscapularis [3]

Origin, insertion, and functions of these muscles are given below:

- Supraspinatus: The supraspinatus muscle originates above the spine of the scapula and inserts on the greater tuberosity of the humerus. The supraspinatus abducts or elevates, the shoulder joint out to the side [3]. It also works with the other rotator cuff muscles to stabilize the head of the humerus in the glenohumeral joint, or shoulder joint.
- Infraspinatus: The infraspinatus muscle originates below the spine of the scapula, in the infraspinatus fossa, and it inserts on the posterior aspect of the greater tuberosity of the humerus. The infraspinatus externally rotates the shoulder joint. It also works with the other rotator cuff muscles to stabilize the head of the humerus in the glenohumeral joint, or shoulder joint [4].
- Teres Minor: The teres minor muscle originates on the lateral scapula border and inserts on the inferior aspect of the greater tuberosity of

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the humerus. The teres minor muscle externally rotates the shoulder joint. It also works with the other rotator cuff muscles to stabilize the head of the humerus in the glenohumeral joint, or shoulder joint

- Subscapularis: The subscapularis muscle originates on the anterior surface of the scapula, sitting directly over the ribs, and inserts on the lesser tuberosity of the humerus. The subscapularis muscle works to depress the head of the humerus allowing it to move freely in the glenohumeral joint during elevation of the arm. It also works with the other rotator cuff muscles to stabilize the head of the humerus in the glenohumeral joint, or shoulder joint [5].

Shoulder dystocia is defined as an impaction of the anterior shoulder against the maternal symphysis pubis after the fetus has birthed and occur when the breadth of shoulder exceeds the diameter of the pelvic inlet. The incidence of shoulder dystocia could be between 0.15% to 1.1%.

The new-born was considered macrosomic if the birth weight 3.5kg or more [6].

Shoulder dystocia is when, after delivery of the head, the baby's anterior shoulder gets caught above the mother's pubic bone. One characteristic of a minority of shoulder dystocia deliveries is the turtle sign, which involves the appearance and retraction of the baby's head (analogous to a turtle withdrawing into its shell), and a red, puffy face. This occurs when the baby's shoulder is obstructed by the maternal pelvis.

The most common complication that occurs due to shoulder dystocia is damage to the upper brachial plexus commonly known as Erb's Palsy with a frequency of 1.5 per 1000 birth in the USA and 1.4 per 1000 birth in worldwide [7].

Symptoms include:

- Nerve damage and pain in the injured area.
- A claw hand appearance
- Paralysis of the affected limb [8]

Risk factors:

- Multigravida
- Gestational diabetes
- Obesity
- Previous operative history of vagina
- Obstructed labour [9]

Brachial plexus palsy occurs when there is damage to the brachial plexus nerves, and includes injuries such as Erb's palsy and Klumpke's Palsy. These conditions typically happen after shoulder dystocia, usually when the nerve damage is so severe that the nerves have been torn, moved, or completely detached [10].

Erb's palsy, a form of obstetric brachial plexus disorder, is an injury that occurs when the nerves in a baby's upper arm are damaged. The injury usually occurs as a result of a lesion at Erb's point, the area near the baby's neck where the fifth and sixth cranial nerves merge to create the upper point of the brachial plexus. The nerves in the brachial plexus give movement and feeling to the baby's arm, hand, and fingers. Erb's palsy is frequently caused by shoulder dystocia during a difficult birth. Infants with this condition usually can't move the affected shoulder or upper arm, but they may be able to wiggle their fingers [11].

Erb's palsy generally occurs during a difficult labor and can happen in different ways.

- One way that the brachial plexus nerves are affected is when the baby is passing through the birth canal at an awkward angle, with the head being turned to one direction while the arm is being pulled in the opposite direction. Excessive pulling on the shoulders is also common in cephalic presentation when the baby is delivered face-first. Both circumstances can involve cephalo-pelvic disproportion (CPD) when the baby is disproportionately bigger than the birth canal [12].

- Another situation in which that Erb's palsy can occur is when the baby is delivered through the birth canal in a breech birth. The brachial plexus nerves can be stressed and injured when the baby's arms are pulled back over the head as the delivering physician pulls the new-born from the birth canal by the legs. During these situations, the baby is violently stretched [13].

Erb's palsy is a paralysis of the arm caused by injury to the upper group of the arm's main nerves, specifically the severing of the upper trunk C5–C6 nerves. The paralysis can be partial or complete; the damage to each nerve can range from bruising to tearing. The most commonly involved nerves are the

- Suprascapular nerve
- Musculocutaneous nerve

Causes of Erb's palsy:

The most common cause of Erb's palsy is dystocia, an abnormal or difficult childbirth or labor. For example, it can occur if the infant's head and neck are pulled toward the side at the same time as the shoulders pass through the birth canal. The condition can also be caused by excessive pulling on the shoulders during a cephalic presentation (head first delivery), or by pressure on the raised arms during a breech (feet first) delivery. Erb's palsy can also affect neonates affected by a clavicle fracture unrelated to dystocia [14].

New born brachial plexus palsy (NBPP) is a neonatal morbidity commonly linked with excessive lateral traction applied to the fetal head with resultant paralysis of the upper limbs. Common risk factor includes are

- Shoulder dystocia
- Large birth weight
- Maternal diabetes
- Prolonged labour pain [15]

Aims and objectives

The object of the study was to determine the frequency of Erb's Palsy in shoulder dystocia and develop some guidelines to reduce the risk of Erb's Palsy in new-born babies.

Operational definition

Prevalence: The proportion of population who have specific characteristics in a given period of time.

Shoulder dystocia: Shoulder dystocia is an emergency condition in which the baby head is stuck in the mother pelvis during delivery.

Erb's palsy: Erb's palsy is a weakness and loss of movement of the arm caused by injury to the nerves of the upper limb.

Rationale

Our Government should focus on Policymaking for better Antenatal care & immediate measures during labour and delivery. Our Hospitals should be equipped with CTG for the continuous monitoring of fetus and mother during labour and delivery. Our doctors should be trained enough to identify high-risk cases of shoulder dystocia so they can shift the birth procedure from Normal Vaginal delivery to C Section so the complication can be eliminated.

Literature Review

Jones conducted a study to determine the incidence, causes, and outcomes of congenital brachial palsy [16]. There were 323 confirmed cases giving an incidence of 0.42 per 1000 live births Significant associated risk factors in comparison with the normal population were shoulder dystocia (60%) relative risk (RR) 3.4. There was a considerably lower risk of CBP in infants delivered by cesarean section RR. The relative risk of partial or no recovery in infants with extensive lesions soon after birth compared with those with less extensive lesions was 11.28 The study concluded that the incidence of Congenital brachial palsy is similar to that previously reported nearly 40 years ago [17].

Yarfi conducted a study to find out the frequency of new born brachial plexus palsy in Accra, Ghana [18]. The aim of this study was to provide hospital-based epidemiological information about new born brachial plexus palsy (NBPP) in Accra, Ghana. A total of 773 patients' were reviewed out of which 210 (27.2%) were cases of NBPP. Using the Graham system of classification, majority (94.8%) of the NBPP cases were of group I type brachial plexus injury or Erb's palsy, with a male predominance of (61.4%), and most (79.5%) were delivered by normal vaginal delivery (52.9%) and most (70.9%) were cephalic in presentation at birth [19]. About 55.2% of cases were referred for physiotherapy within one month of diagnosis. The results indicate that birth weight exceeding 4.0kg, vertex presentation, and vaginal delivery was the noticeable factors for NBPP in this population [20].

Gherman conducted a study to find out whether spontaneous vaginal delivery is a risk factor for Erb's palsy or not. The purpose of the study was to determine whether Erb's palsies occurring in the absence of shoulder dystocia differ from those occurring after shoulder dystocia [21]. The incidence of persistent injury at 1 year of age in 17 cases of Erb's palsy without shoulder dystocia and 23 cases associated with shoulder Dystocia. 7 of 17 (41.2%) v/s 2 of 23 (8.7%) are those cases of Erb's palsies that also took longer to resolve had a higher rate of associated clavicular fracture and were more likely to occur in the posterior arm. The study concluded that Erb's palsy occurring without shoulder dystocia may be a different injury than that occurring with shoulder dystocia [22].

Mollberg conducted a study to find out that shoulder dystocia is the strongest risk factor for obstetrical brachial plexus palsy [OBPP] [23]. The aim of this work was to study the incidence of OBPP and to analyse its risk factors [24]. All deliveries recorded between 1987 and 1997 were investigated. The incidence of OBPP increased from 0.17 in 1987 to 0.27% in 1997. During the same time period, the mean birth weight increased from 3483 to 3525 g. Birth weight increasing from 4000 g was associated with a progressive rise in OBPP risk. Other significant risk factors associated with the injury were shoulder dystocia, breech presentation in vaginal delivery, operative vaginal delivery, diabetes mellitus, induction of labour, protracted active phase, secondary arrest of dilatation, and epidural anesthesia. The conclusion of the study was that shoulder dystocia and infant birth weight of 4500 g or 4.5 kg are the strongest risk factors for OBPP [25].

Okay et al. conducted a study whose purpose was to identify the risk factors for neonatal brachial plexus paralysis. The prevalence of brachial plexus paralysis was 1.62/1,000 (9/5,525) vaginal births [26]. Independent risk factors for brachial plexus paralysis were shoulder dystocia, vacuum delivery, macrosomia (birth weight >4,000 g, prolonged second stage, and vaginal breech delivery, Shoulder dystocia, macrosomia, labor dystocia, vacuum delivery, and vaginal breech deliveries were significant risk factors for neonatal brachial plexus paralysis, while maternal characteristics such as obesity and diabetes were not. Despite the growing knowledge concerning the risk factors associated with brachial plexus paralysis, unfortunately, this condition cannot be predicted or prevented [27].

Gilbert et al. conducted a study to find out associated factors in brachial plexus injury in a large population [28]. Among 1,094,298 women who delivered during the 2 years, 1611 (0.15%) had diagnoses of brachial plexus injury. The frequency of diagnosis increased with the addition of gestational diabetes, forceps delivery, vacuum extraction and shoulder dystocia In cases of brachial plexus injury, the frequency of shoulder dystocia increased from 22%, when birth weight ranged between 2.5 and 3.5 kg, to 74%, when birth weight exceeded 4.5 kg. They concluded that in macrosomic newborns, shoulder dystocia was associated with brachial plexus injury, but in low- and normal-weight infants, but other malpresentation" was diagnosed more frequently than shoulder dystocia. Study findings suggest that brachial plexus injury has caused in addition to shoulder dystocia and might result from an abnormality during the antepartum or intrapartum period [29].

Graham conducted a study to analyze Erb's palsy cases and their relation to birth weight and trauma at delivery. Brachial plexus injury was assumed to be associated with the traumatic delivery of a macrosomic fetus in the vast majority of cases [30]. This study was undertaken to examine the relationship of brachial plexus injury to birth weight and trauma at delivery, There were 14 cases of Erb's palsy out of 11,484 vaginal deliveries (0.12%) and one case of Erb's palsy out of 2,874 cesarean deliveries. There was birth trauma (i.e., shoulder dystocia) noted at the time of delivery in eight cases (53.3%). However, a surprising finding was that in the other seven cases (46.7%) there was no evidence of shoulder dystocia at delivery. In the group in which Erb's palsy occurred and trauma was noted at the time of delivery, the average birth weight was 4,265 ± 480 g (range 3,550-5,110 g), with seven out of eight (88%) being large for gestational age (LGA). In the group in which Erb's palsy occurred but no trauma was noted at the time of delivery, the average birth weight was 2,906 ± 745 g (range 1,590-3,950 g), with one out of seven (14%) being Large gestational age [30].

Foad conducted a study to determine the epidemiology of neonatal brachial plexus palsy [31]. The purpose of this study was to determine the incidence of this condition and to identify potential risk factors for neonatal brachial plexus palsy. Patients were identified with the use of the International Classification of Diseases. Over eleven million births were recorded in the database, and 17,334 had a documented brachial plexus injury in a total of three years. In the multivariate analysis, shoulder dystocia had a 100 times greater risk, an exceptionally large baby (>4.5 kg) had a fourteen times greater risk, and forceps delivery had a nine times greater risk for injury. Having a twin or multiple birth mates and delivery by cesarean section had a protective effect against the occurrence of neonatal brachial plexus palsy. Forty-six percent of all children with neonatal brachial plexus palsy had one or more known risk factors, and fifty-four percent had no known risk factors. The

conclusion was shoulder dystocia had greater risk for Erb's palsy than other risk factors [32].

Materials and Methods

Study design

This was a cross-sectional study.

Settings

Data was collected in Bakkhtawar Amin Hospital and Children Hospital, Multan.

Duration of study

A study was completed within 6 months.

Sampling technique

Non-Probability purposive sampling technique was used to collect the data.

Sample size

Z=for 95% confidence interval Z value is 1.96

E=we took 10% margin of error that our sensitivity in our study can be 90% or 70%

P=0.20 (assuming 20% of proportion we have)

$N=(Z/E)^2 p(1-p)$

$N=(1.96/0.10)^2 (0.80) (0.20)$

$=(3.8416/0.01) (0.80) (0.20)$

$=384 \times 0.16=61.54$

$=62$

Sample selection

The selection of the sample was done by obeying the following criteria i-e inclusion and exclusion.

Inclusion Criteria

- Female subject was selected
- Age not less than 20 years and not more than 35 year
- Spontaneous vaginal deliveries.

Exclusion Criteria

- Male subject not selected
- Age less than 20 years and more than 35 years

Data collection

Data were collected by questionnaire form set on paper. Questions will consist of multiple-choice options. The questionnaire will consist of self-designed questionnaires. Before the data collection identity of the author and the research project and its purpose will be delivered verbally among participants and written consent form will be taken.

Data analysis

SPSS 20 was used for data entry and analysis. Mean deviation ± standard deviation was been used to present the quantitative analysis. While the frequency tables and useful graphs were used if applicable to present the qualitative analysis.

Results

A total of 62 cases are included in our study of age ranging from 20-35 years for only females. All the cases had shoulder dystocia. Findings of factors & their frequencies & relations associated with shoulder dystocia are displayed in Tables 1-10 and Figures 1-10.

Age	Frequency	Percent	Mean ± SD
23	5	8.1	28.42 ± 3.175
24	4	6.5	
25	5	8.1	
26	5	8.1	
27	5	8.1	
28	7	11.3	
29	4	6.5	
30	11	17.7	
31	2	3.2	
32	9	14.5	
33	3	4.8	
35	2	3.2	
Total	62	100	

Table 1: Frequency of different age group.

Presentation	Frequency	Percent	Mean ± SD
Breech	38	61.3	1.3871 ± 0.49106
Vertex	24	38.7	
Total	62	100	

Table 2: Frequency of presentation.

Birth procedure	Frequency	Percent	Mean ± SD
NVD	59	95.2	1.05 ± 0.216
C-section	3	4.8	
Total	62	100	

Table 3: Frequency of different birth procedure.

Disease	Frequency	Percent	Mean ± SD
No	9	14.5	2.4355 ± 0.82225
Hypertension	21	33.9	
Obesity	28	45.2	
Viral infection	4	6.5	
Total	62	100	

Table 4: Frequency of diseases.

Complication	Frequency	Percent	Mean ± SD
No	9	14.5	1.8548 ± 0.35514
yes	53	85.5	
Total	62	100	

Table 5: Frequency of complications.

Positive complication	Frequency	Percent	Mean ± SD
No	9	14.5	1.85 ± 0.601
GDM	14	22.6	
Pre eclampsia	33	53.2	
Placenta previa	6	9.7	
Total	62	100	

Table 6: Frequency of positive complications.

Fetal weight	Frequency	Percent	Mean ± SD
Normal	13	21	2.79 ± 0.410
Over weight	49	79	
Total	62	100	

Table 7: Frequency of normal and overweight fetus.

Erb's palsy	Frequency	Percent	Mean ± SD
No	11	17.7	
Yes	51	82.3	1.8226 ± 0.38514
Total	62	100	

Table 8: Frequency of Erb's palsy.

Nerve damage	Frequency	Percent	Mean ± SD
Axillary Nerve	7	11.3	2.5323 ± 1.00356
Musculocutaneous nerve	28	45.2	
Subscapular nerve	17	27.4	
All	7	11.3	
No	3	4.8	
Total	62	100	

Table 9: Frequency of nerve damage.

Deformity	Frequency	Percent	Mean ± SD
Scapular deformity	14	22.6	2.26 ± 1.085
Waiters tip deformity	31	50	
Claw hand deformity	7	11.3	
All	7	11.3	
No	3	4.8	
Total	62	100	

Table 10: Frequency of deformity.

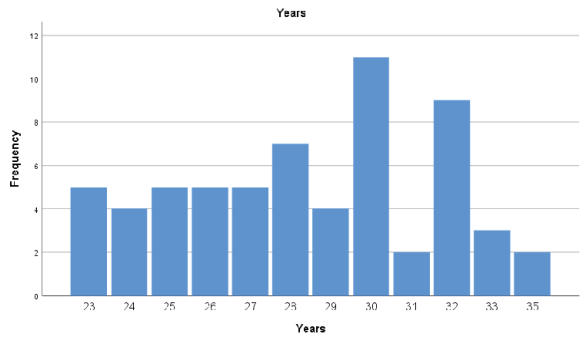

Figure 1: Frequency of different age group.

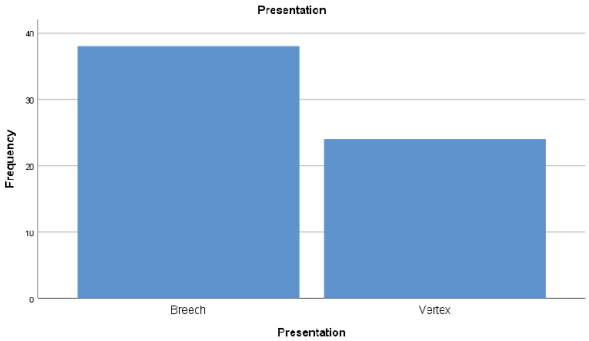

Figure 2: Frequency of presentation.

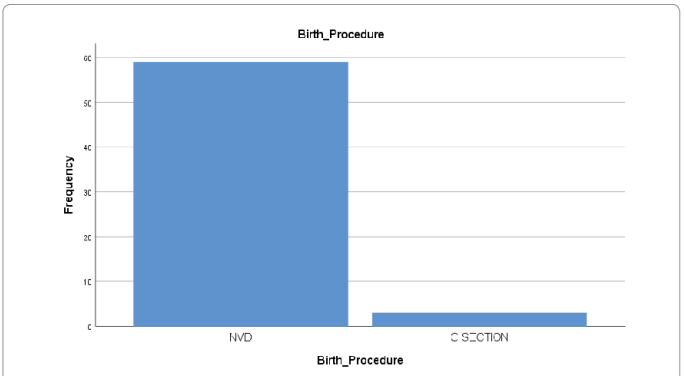

Figure 3: Frequency of different birth procedure.

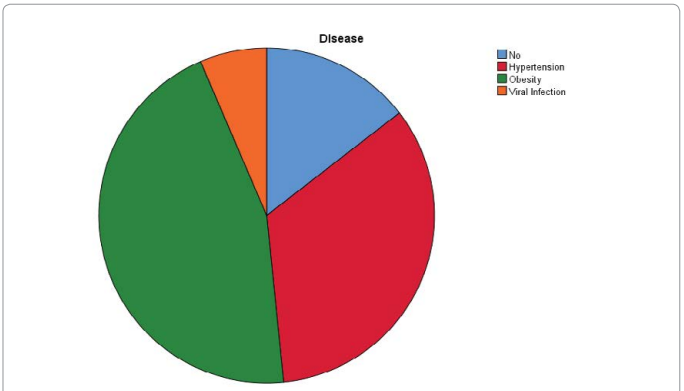

Figure 4: Frequency of diseases.

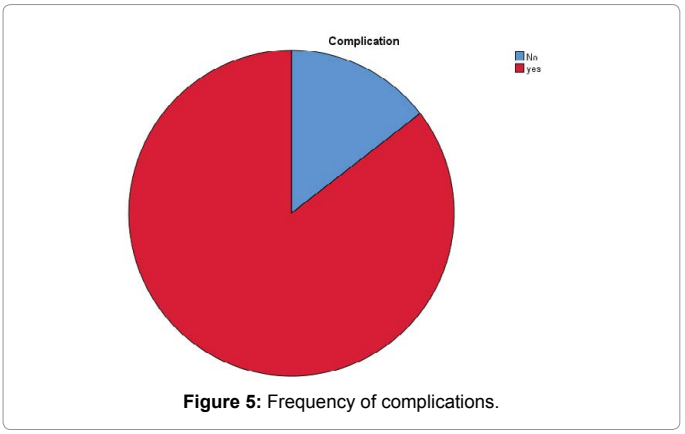

Figure 5: Frequency of complications.

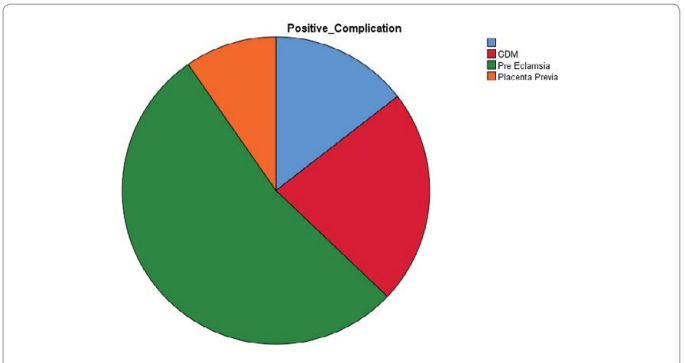

Figure 6: Frequency of positive complications.

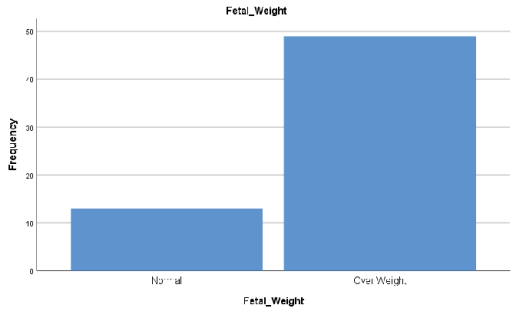

Figure 7: Frequency of normal and overweight fetus.

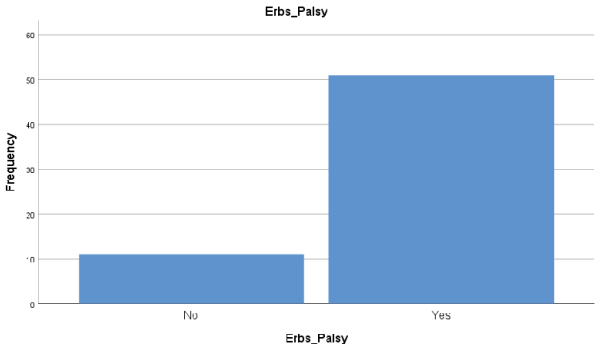

Figure 8: Frequency of Erbs palsy.

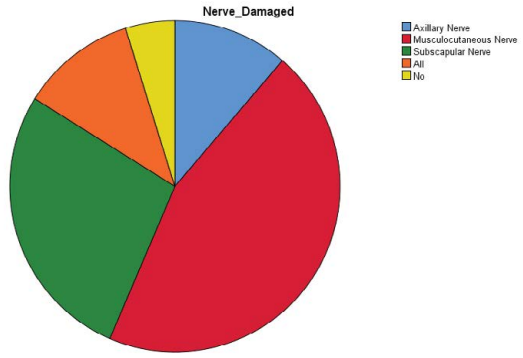

Figure 9: Frequency of nerve damage.

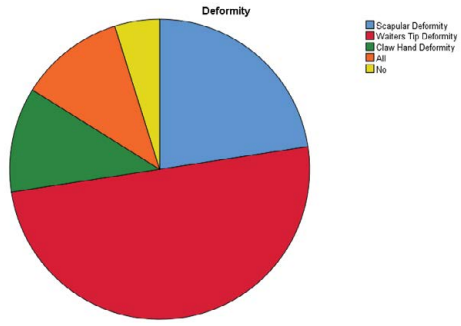

Figure 10: Frequency of deformity.

Discussion

Shoulder Dystocia is a complication that occurs during delivery when an infant's shoulder becomes lodged in the mother's pelvic. The cause when the shoulder dystocia happens is when the baby is pulled out by face causing undue stress on the neck or when the baby is born feet first; also creating undue stress on the shoulder & neck area (Erb's Point).

Our objective was to determine the prevalence of Erb's Palsy due to shoulder dystocia. 62 cases were evaluated for Erb's palsy, the study consists of females of age ranging from 20-35 years. The frequency of shoulder dystocia was highest in 30 years of age groups which were 17.7% & was lowest in 35 years of age groups which was 3.2%. 61.3% of cases have a breech presentation with shoulder dystocia & 38.7% shoulder dystocia cases had vertex presentation. 4.8% of cases with shoulder dystocia have C-Section & 95.2% cases have normal vaginal delivery. 14.5% of shoulder dystocia cases had no significant disease. 45.2% of cases had maternal obesity followed by Hypertension and Viral infection with percentages 33.9% & 6.5% respectively. 14.5% of shoulder dystocia cases had no significant complications during pregnancy. 53.2% of shoulder dystocia cases had pre-eclampsia as a complication, 9.7% cases having placenta previa and 22.6% cases had gestational diabetes.

The relation between overweight & shoulder dystocia was significant having 79% cases. Our study shows 21% of cases had normal fetal weight. Shoulder dystocia has a very significant relationship with Erb's palsy having 82.3% of cases & 17.7% cases don't have Erb's palsy sign and symptoms.

In Erb's palsy 45.2% of cases had damaged musculocutaneous nerve followed by 27.4% Subscapular nerve damage, & 11.3% cases had multiple nerve damage. 50% Erb's palsy cases had Waiter's tip deformity due to shoulder dystocia followed by Scapular deformity, 22.6% and 11.3% had Claw hand deformity.

The previous studies were conducted to determine the incidence, causes, and outcome of congenital brachial palsy. In our research, we determined the factors, their frequencies, and relationships associated with shoulder dystocia. The past studies conducted to analyse Erb's palsy cases in their relation to birth weight and trauma and delivery. In our research, there is a significant relation of shoulder dystocia with Erb's palsy. Past studies also conducted to find out spontaneous vaginal delivery is a risk for Erb's palsy or not. The purpose of studies conducted in the present and past is to determine whether Erb's palsy occurring in the absence of shoulder Dystocia differ from those occurring after shoulder Dystocia. All the risk factors and complications found in our research were also previously reported in Past conducted studies theses complications and risk factors were heavy fetal weight, breech delivery, gestational diabetes, preeclampsia, and placenta Previa.

Conclusion

Our Study Indicates that 82.3% Cases of Shoulder dystocia had Erb's palsy that is alarming situation.

Limitations

- Shortage of time
- The sample size was small.
- Lack of follow up of patients due to early discharge from the hospital.

- Lack of awareness of the patients

Recommendation

- Sample size should be large
- Study design should be modified
- Geological area should be greater
- Focus on public awareness

Acknowledgment

In the name of ALLAH (SWT) the Most Beneficent, the Most Merciful, who has given us the strength and ability to complete this study? All praises belong to ALLAH (SWT), Lord of the universe. May His blessings be upon the Prophet Muhammad (SAWW) and members of his family and companions?

Special thanks to our parents who were always there for us, supporting and encouraging us with their precious prayers and best wishes.

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