Assessment of the Fetal Weight; Application of Johnson's Formula Versus Help of Ultrasonography.

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Perinatal mortality rate is 95.1 /1000 live births in Pakistan which is much higher when compared to the developed countries (United Kingdom 35, Japan19)and still high in comparison to the developing countries(India 48.6,Burma 57.2, Indonesia 45 and Thailand 28.3) .This perinatal mortality in addition to many other factors is very closely related to the weight of the fetus , below or above normal . Average normal birth weight is 2.5-4.5 kg . Birth weight between 1.5-2.5 kg is low birth weight , between 1.0-1.5 kg is very low birth weight and below 1.5 kg it is declared extremely low birth weight . If the weight of the delivered conceptus is below 0.5 kg it is known as abortion /miscarriage. My study is focused on assessing the weight of the baby for which I have applied Johnson's formula and compared with ultrasonographic assessment later confirmed by weighing fetus after delivery. In addition gestation age , mode of the delivery , presence of any risk factor , and fetal out come in perinatal period were noted .
Key words : fetal weight ; perinatal mortality.

Pakistan is a developing country which has high maternal and perinatal mortality rate. These high rates are associated with high fertility rate, it is because of the marriages at younger age and non-practicing attitude of our majority toward the family planning methods. An other important factor related to this is non availability of the legal abortion. Perinatal mortality is well correlated to the weight of the fetus . My study is focused on the weight assessment by the Johnson's formula and it's comparison with ultrasonographic weight assessment . In addition related information regarding this were also noted like , gestation age, fundal height , any risk factor; and vaginal examination for station.

Assessment of the fetal weight was one important factor in prognosis of fetal out come .

Fetus may be small for dates in false gestational age (unsure dates), Intrauterine growth restriction ,fatal death, transverse lie and oligohyderamnios. Intrauterine growth restriction may be due to hypertention ,diabetes mellitus , low maternal weight and placental or fetal pathology.

Fetus may be larger than dates in false gestational age (unsure dates), fatty abdomen, pregnancy with fibroid uterus, diabetes mellitus, polyhyderamnios, macrosomia, multiple pregnancy and abruptio placentae.

Aims & Objectives.

1. Assessment of the fetal weight by Johnson's formula and comparing with ultrasonographic assessment and confirming later after the delivery .
2. Assessing fetal weight with fetal out come.

Material & Method

Our study was conducted during six month time period from 1st Jan –31st July 2000 . Nine hundred and eighty four patients were delivered at unit II , Lady Willingdon Hospital , Lahore. Patients presenting in the labour room of Unit II during this period were included in the study provided that they had single foetus after gestational age of 28 weeks with longitudinal lie and cephalic presentation (since the assessment error for the fetal weight is higher at other than cephalic presentation). A proforma was filled for the required information .

Proforma contained information regarding gestational age, risk factors (obstetric and medical), weight of the patient , abdominal and vaginal examination findings .Later ultrasonographic assessment of the fetal weight was done .

JOHNSON'S FORMULA

(Fundal height in centimeters - N) X 1.55 = Weight of the fetus in grams .

While,

N = 11; if station is 0, or –1,-2, -3 .

N = 12 ; if station is +1, +2 , or +3 .

If the weight of the mother is above 90 kg then add 1cm . in the fundal height .

ASSESSMENT OF FETAL WEIGHT BY ULTRASONOGRAPHY:

(abdominal diameter in trasverse + Abdominal diameter in vertical) X 0.67 = Weight of the fetus in grams .

Results

Seven hundred and forty four patients presenting in the Unit II ,Lady Willingdon Hospital Lahore were recruited in the study.115 were booked and 629 were unbooked 52 were of gestational age 28-32weeks,130 of 32-36weeks and 352 at 36-40weeks . 210 cases were beyond 40 weeks gestation .

Four hundred and forty patients were with out any risk factors. Risk factors as hypertension and diabetes were present in 62 and 69 patients respectively. Thirty eight had history of infection (urinary tract, respiratory or genital tract) Eighteen patients had rhesus incompatibility and 73

had low maternal weight .Only 40 patients had intrauterine growth restriction .

Assessment by Johnson's formula;

Total number of patients in the study at Lady Willingdon Hospital , Lahore = 744

Gestational age (weeks)	weight of fetus (johnson's formula) mean in kilograms	Weight of fetus (difference after delivery) mean in kilograms
28-32	1.3± 0.4	±0.6
32-36	1.9 ±0.4	±0.5
36-40	2.3 ±0.9	±0.8
40-more	3.1 ±1.2	±1.2

Assessment of the fetal weight by Ultrasonography:

Total number of patients in the study at Lady Willingdon Hospital , Lahore = 744

gestational age(weeks)	Fetal weight (ultrasonography) mean in kilograms	Weight of fetus (difference after delivery) mean in kilograms
28-32	1.4 ±0.3	±0.4
32-36	2.0 ±0.3	±0.3
36-40	2.6 ±0.6	±0.5
40-more	3.2 ± 0.4	±1.2

532(71.4%)were spontaneous vaginal delivery, 88(12.8%) assisted delivery (forceps/ vacuum) and 124 (16.8%) by cesarean sections.

Fetal out come was assessed with reference to fetal birth weight ,24 patients (53.3%) had intrauterine death, 9cases (20.5%) stillbirth and 12(26.2%) early neonatal death .Total fetal losses were 45 . Out of these 29 had birth weight between 1.5-2.5 kg, six between one and 1.5 kg ,two fetuses below 1.5 kg. Only one above 4.5 kg and seven having normal fetal weight i.e 2.5-4.5 kg.

Apgar score at five minutes was below 5 in 79 (10.7%), between 5-8 in 514(69.2%) and above 8 in 151 (20.1%).

Maternal weight 50-60 kg in 84(11.3%), 60-70kg in 335(45.1%),70-80 kg in 226(30.4%) and 80 or more in 99(13.2%) patients.

Discussion

Seven hundred and forty four patients who presented at Lady Willingdon Hospital, Lahore were recruited in the study during 7 months 1st January to 31st July 2000. High percentage of the patients were un-booked. This shows that our majority is not utilizing available medical facilities . Ignorance, illiteracy, social barrier , and dominance of the practicing traditional birth attendants are additional factors responsible for non booking . And of course unbooked cases are more associated with risk factors .For example low birth weight is more common because of unsupervised antenatal follow-up .

Fifty two patients has presented at the gestational age of 28-32 weeks and 130 at gestation 32-36 weeks. So 182(21.3%) are presenting and being delivered at preterm. Small for the gestation is prevalent in almost 10% of the general population .This is associated with increased fetal morbidity and mortality, Soothill et al (1995). At 28-32 weeks are the patients who have fetal weight 1.0 -1.5 kg , which is very low birth weight having poor out come . Patient at gestational age 34-36 weeks weigh between 1.5-2.5 kg which is still a low birth weight .

Patients of the post date mothers and diabetic patients are the one who weigh around or beyond 4.5 kg. In our study 210 were at gestation above 40 weeks .

Patients with risk factors are one who can have fetus smaller for gestational age , leading to the low birth weight fetuses . Morbidity includes impaired growth and neurodevelopment and increased risk of cerebral palsy , Blair and Stanley ,(1992). It's long term effects include maturity onset diabetes and cardiovascular diseases Barker (1993).

Diabetic and post-term mothers can have good sized babies (weighing more than 4.5 kg) . So identification of the risk factors, managing accordingly and delivering at or near term by the preferable option may improve fetal out come. Investigations include pathology (placental insufficiency) related , one among these is anti phopholipid syndrome. Anti-phopholipid antibodies are one which are positive in 30-60% of the small for gestation fetuses, Pozlin et al(1991) ,while atypical placental vascuolopathies are also seen in these cases, Lockshin (1993).

Only the extreme malnutrition is associated with small for gestation fetuses, Stein and Susser (1975).

In a large study conducted in Denmark demonstrated twice the chance of birth weight below 2500 grams in anorexic mothers, Brinch and Isager T (1988). In another study women with below 19 body mass index at conception had twice the chance of delivering fetus below 10th percentile compared to those with normal body weight , Van den spuy et al (1988).

Smoking and alcohol adversely effecting the fetuses especially in third trimester and associated with small for getstational age , Liberman E et al (1994).But this factor is non prevalent in our population .

Documented in another study that there is 12 fold increased incidence of fetal weight below 2 SD in alcoholics, Olegrad et al (1979)..

Infections are one risk factor leading to placental insufficiency and low birth weight Vaginal infections (trichomonas vaginalis , bacteroides, M. hominis and U. urealyticum) is also associated with increased incidence of the fetus being small for the gestation, Germain et al (1994). In addition to less adequate conditions and being nutritionally deprived, the infected patients are poorly educated as well, Villar and Klebenoff (1988).

Assessment of the fetal weight by the Johnson's formula corelated well with the fetal weight checked after the delivery , more so at 32-36 weeks gestation , fundal height matching the gestational age and 60-70kg maternal weight .

It seems not to correlate well at 36-40 weeks gestational age and 36-40 weeks fundal height. Maternal weight below 60kg and above 70kgalso shows greater disparity between the estimated and actual baby weight. Probably the reason is this that it has not been modified with minor changes in the parameters but to the gross changes .As (N) stays as 11 at stations –1, -2 ,-3 and 0. While 12 on all stations plus one to plus three. Adding just 1 cm . in all the patients weighing beyond 90 kg with a wide margin of error.

Weight assessment like wise is more correct at gestational age 28-36 weeks by ultrasonography and fetuses weighing between 1-3 kg . While it astrays from correct figures at gestational age of 40 or more weeks and fetal weight below 1kg or above 3 kg.

Fetal out come was assessed with reference to fetal birth weight ,24 patients (53.3%) had intrauterine death, 9cases (20.5%) stillbirth and 12(26.2%) early neonatal death . In all of these birth weight was below normal. Apgar score at five minutes was below 5 in 79 (10.7%), between 5-8 in 514(69.2%) and above 8 in 151 (20.1%).
124 (16.8%) fetuses were delivered by cesarean section , indication were known risk factors like hypertension , diabetes mellitus or antepartum haemorrhage leading to the fetal distress. Total fetal losses were 45 . Out of these 29 had birth weight between 1.5-2.5 kg, six between one and 1.5 kg ,two fetuses below 1.5 kg. Only one above 4.5 kg and seven having normal fetal weight i.e 2.5-4.5kg. Here is quite clear relationship between birth weight of the fetus and it's out come .

Conclusion

Low birth weight is associated with multiple complications, one set due to low birth weight like propensity to infections ,high morbidity and mortality . And another set of complication as a causative agent for low birth weight which include prematurity, multiple pregnancy, maternal medical disorder like hypertension/ diabetes mellitus and smoking or alcohol intake.

Recognition of these risk factor and their management accordingly leads to enhanced gestation and improved prognosis . Last but not the least maternal weight well corresponds to the fetal weight only when it's extremely low .So it is mandatory to take care of the maternal weight during pregnancy by providing balanced diet and avoiding any deficiency. Dieting during the pregnancy should be discouraged .

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