IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 01 Ver. VI January. (2018), PP 11-15
www.iosrjournals.org

A Comparative Study of Intravenous Amino Acid Infusion And Oral Amino Acid Supplementation on The Improvement of Amniotic Fluid Index During 3rd Trimester of Pregnancy.

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Abstract
Background*: Amniotic fluid index (AFI) is a part of biophysical profile which is a quantitative estimate of amniotic fluid volume in centimetre. Amniotic fluid index is indicator of foetal well being. The exact number varies according to gestational age. Oligohydromnios in 3rd trimester may cause IUGR, IUD, pre-term birth, foetal distress, meconium stained liquor, cord compression, increase incidence of caesarean delivery, early neonatal hospitalization.*
Objective*: To compare the efficacy of intra-venous amino acid infusion and oral amino acid supplementation on improvement of AFI during 3rd trimester of pregnancy.*
Materials &Methods *:106hospitalised pregnant patients at POG >32 weeks with AFI < 7cm were randomly allocated into two groups of 53 patients each. One group were prescribed with intravenous amino acid infusion, other with oral amino acid supplementation for fortnight. Other advices like bed rest in left lateral position, plenty of fluid intake, vitamins and other nutrients supplementations were same. Maternal hemodynamic status, maternal weight in kg, POG in weeks, TAS, SFH, AG,AFI in cm, EFW in grams were recorded on day one of the treatment and compared with these parameters on day 21st of the treatment.*
Result*: The maternal hemodynamic status were unaltered for both groups with P>0.05. There were statistically significant difference in increase in maternal weight, AG, SFH, AFI, EFW in two group.*
Conclusion*: Intravenous amino acid infusion in present study group cause significant increase in maternal weight, SFH, AG, AFI, EFW than oral amino acid supplementation under same setup.*
Keywords : *foetus, Oligohydromnios, Polyhydromnios, IUD.*

Date of Submission: 19-12-2017 Date of acceptance:09-01-2018

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1. Introduction

AFI is the score given to the amount of amniotic fluid seen on USG of pregnant uterus, and measured by four quadrant technique.[1]The maternal umbilicus is taken as reference point for division of quadrants, and transducer is kept perpendicular to the surface of abdomen. AFI is the fifth parameter in traditional five point BPP, and second parameter in rapid two point modified BPP.[2]The ultimate goal of ante-partum surveillance program is to improve peri-natal outcome and to decrease intrauterine fetal demise besides prevention of maternal morbidity and mortality.[3]A fetus in distress should be identified at the earliest so that timely delivery will not only salvage the fetus but also prevent long term neurological impairments such as injury to fetal central nervous system.[4]The values between 8 and 25 are considered to be normal, 5–8 low normal, and less than 5 severe oligoamnios.[5] Normally it peaks at 32 to 34 weeks of gestation and thereafter there is a gradual reduction in amniotic fluid due to increase in concentrating capacity of fetal kidneys.[6]Though there is no definite said protocol for identifying compromised fetus, many believe that biweekly non-stress test and AFI assessment should be offered to all women at risk.[7] In addition to number of other factors, poor maternal nutrition status has been co-related with increased incidence of Oligohydromnios in 3rd trimester and adverse fetal outcome in developing countries. Apart from the poor maternal nutrition, biological, socioeconomic, teenage pregnancy, short inter-pregnancy interval also influence poor birth outcomes.[8]Food and Agriculture Organization/World Health Organization (WHO)/United Nations University recommend pregnant women to have their energy intake increased by 85, 285, and 475 kcal/day during the first, the second, and the third trimesters of pregnancy, respectively.[9]Sufficient reports showed significant reduction in LBW babies among women receiving multi-micronutrient supplements compared with women only receiving iron and folic acid supplements.[10]The study was undertaken to evaluate the comparative efficacy of intravenous amino acid infusion and oral amino acid supplementation on increase in AFI in 3rd trimester of pregnancy. The aim of this consensus document is to

review the available literature on dietary requirements and health of women during pregnancy, focusing on selected nutrients for which the need of greater attention is supported by solid evidence, both in the general female population, and in specific population groups.

II. Materials And Methods

The present study was conducted on 106 pregnant patients at POG >32 Weeks with oligohydromnios and admitted in our Dept. Obstetrics & Gynecology, RIMS, Imphal.

2.1 Inclusion criteria

1. Maternal age between 18 – 30 years
2. POG >32 weeks &<40weeks
3. Singleton pregnancy
4. AFI <7cm &>5cm
5. Intact fetal membrane
6. Parity ≤ 3

2.2 **Exclusion criteria** :

1. POG>40 weeks and <31weeka and 6days
2. Multifetal pregnancy
3. Anomalous fetus(confirmed by USG)
4. Polyhydromnios
5. Rupture of membrane(term or pre-term)
6. On medication like ACE inhibitor & PG synthatase inhibitor
7. Patients with major Cardiovascular, Respiratory or other pathology.

It has been divided into two groups of 53 patients each group:

Group A (n = 53) – prescribed with intravenous amino acid infusion for two consecutive weeks. 10% Dextrose (500ml) followed by 200cc of complex amino acid solution.

Group B (n = 53) - prescribed with oral amino acid supplementation, for two consecutive weeks.
- 3gm of complex amino acid powder with a glass of water, twice daily.

Detailed clinical history including parity, Obstetrical history has been taken. General examination, systemic examination, obstetrical examination has been done for every patient. All the routine investigations including complete haemogram, urine routine examination, S. Thyroid profile, liver and kidney function test, ABO grouping and Rh typing, blood sugar estimation, trans-abdominal sonography has been carried out on routine basis. Informed written consent has been taken for each and every case. Maternal hemodynamic status, maternal weight in kg, POG in weeks, SFH, AG,AFI in cm, EFW in kilograms were recorded on day one of the treatmentBaseline parameters such as systolic BP, Diastolic BP, Oxygen saturation, P/R were recorded.

Group - A patients were prescribed with intravenous amino acid infusion, while Group – B with oral amino acid supplementation for two consecutive weeks. Advices like complete bed rest in left lateral position, plenty of fluid intake, vitamins and other nutrients supplementations were same for both groups. Patient had been advised for maintaining DFM charting.Maternal body weight, AG, SFH, EFW, AFI were compared on day 21stof the treatment. Trans-abdominal sonography were taken on two respective days, mentioned earlier. The ultrasound examination was carried out after instructing the patient to empty her bladder. The examinations were performed with a convex 3.5 MHz probe (Philips HD11XE ultrasound equipment). The patient was asked to lie down in supine position. Uterus was arbitrarily divided into four quadrants using linea-nigra as a vertical line and a transverse line passing through umbilicus. Amniotic fluid was calculated in centimeters excluding the cord loops and small fetal parts, the transducer was placed in each of these quadrants in sagittal plane perpendicular to patient's abdomen.

III. Statistical Analysis

All the parameters recorded were entered in excel sheet. Analysis of variance has been used to find the significance of study parameters between two groups. The statistical software, namely Statistical Package for Social Sciences for windows (SPSS) version 21.0 was used for the analysis of the data. Microsoft word and Excel have been used to generate graphs, tables, etc.

IV. Result

The study was conducted over a period of one and half years i.e. from 1st June 2016 to 30th November 2017 at the Department of Obstetrics and Gynaecology, RIMS, Imphal. One hundred and six hospitalised pregnant patients at POG >32 weeks with AFI < 7cm were randomly allocated into two groups of 53 patients each. The groups were comparable with respect to POG and age of the patient. There were no significant difference in demographic profile among the two groups. Gestational age was estimated from the date of last menstrual period (LMP) and amended by means of ultra sonography in women with unknown or unreliable LMP. Inter-pregnancy interval was defined as the time elapsed between the woman's last delivery and the date

of the last menstrual period for the index pregnancy. Efficacy depending on the route of amino acid supplementation in relation to maternal weight gain, increase in AFI, AG, EFW was contemplated and plotted accordingly. Associated foeto-maternal morbidities and mortality were also taken into consideration in the study.

3.1 Outcome after intervention was assessed with respect to;

1. Gain in maternal body weight
2. Increase in AG (abdominal girth)
3. Increase in SFH (symphysio-fundal height)
4. Gain in AFI
5. Increase in EFW

1. Gain in Maternal weight in two groups. In Group – A maternal weight gain was 0.75 - .85 kg per week, while it was 0.45 - .65 kg per week for Group - B.
2. AG increase was in the range of 1.5 – 1.8 inch in Group – A patients while it was 1.2 to 1.5 inch in Group – B patients in three weeks.
3. SFH increase in Group –A was in the range of 0.68 – 0.98cm while it was in the range of 0.58 – 0.64cm in Group –B patients.
4. AFI Increase for Group – A was in the range of 1.5 -2.8 cm, while increase of 1 – 1.2 cm was observed for Group – B patients after three weeks.
5. EFW Increase in Group – A patient was in the range of 0.625 – 0.675 kg in three weeks while increase was in the range of 0.585 – 0.600kg n Group – B over three weeks of period.

Table 1: Relationship Between Intravenous Amino Acid Infusion And Estimated Foetal Weight Increase

AFI after amino acid infusion	Number	Weight of foetus on day 1st	Weight of foetus on day 21ST	
≤ 5cm	2	1.6	2.43	
5.1- 7 cm	12	2.2	2.82	
≥7 cm	39	2.4	3.05	-
Total no. of babies 53(100%)	53			

Table 2: Relationship Between Oral Amino Acid Supplementation & Estimated Foetal Weight Increase

AFI after oral amino acid supplementation	Number	Weight of baby on day 1stIn kg	Weight of baby after 3rd week	
≤ 5cm	3	1.8	2.30	
5.1- 7 cm	18	2.2	2.80	
≥7 cm (	32	2.4	2.98	-
Total no. of babies 53 (100%)	53			

Table 3: Relationship Between Intravenous Amino Acid Infusion And AFI Increase

AFI after amino acid infusion	Number	AFI on day 1st	AFI on day 21st	
≤ 5cm	2	5.2	6.8	
5.1- 7 cm	12	6.6	8.5	
≥7 cm	39	7.2	9	-
Total no. of babies 53 (100%)	53			

Table 4: Relationship Between Oral Amino Acid Supplementation And AFI Increase

AFI after oral amino acid supplementation	Number	AFI on day 1st	AFI on day 21st	
≤ 5cm	3	5.2	6.4	
5.1- 7 cm	18	6.8	7.8	
≥7 cm (	32	7.5	**8.5**	-
Total no. of babies 53 (100%)	53			

Table 5: Distribution Of Patients According To Foetal Outcome (Dead/Live) At Birth

Foetal outcome at birth	No. of babies	% of babies
Alive	104	98.11%
Dead	2	1.89%
Total no. of babies	106	100%

V. Discussion

There is a complex and dynamic process which involves the fetus, placenta, and mother in amniotic fluid production and regulation. There is increase in amniotic fluid volume gradually till 32–34 weeks of gestation and thereafter there is a gradual reduction till term. [11] There is wide variation in reference standards for mean AFI values according to population, race, and geography.[1]The AFI values differed throughout the gestation and there was a gradual decline in the values as pregnancy advanced. The 5th, 50th, and 95th percentiles ranged from 11.7, 14.6, and 17.3, respectively, at 34 weeks to 8.7, 10.8, and 13.7, respectively, at 40 weeks. [1]During pregnancy, the pregnant mother undergoes significant anatomical and physiological changes in order to nurture and accommodate the developing foetus. These changes begin after conception and affect every organ system in the body.[2]In developing countries, specific dietary intakes in pregnancy are often inadequate, some selected nutrients are often insufficient in pregnant and lactating women. Specific cases requiring clinical examinations and targeted interventions in the peri-natal period include women with weight problems (underweight or overweight/obese), smokers, adolescents, mothers who have had multiple or close pregnancies, and those with previous unfavorable pregnancy outcomes. From a nutritional point of view, particular attention should be paid to women of childbearing age following exclusion diets, especially during pregnancy and lactation, due to the increased risk of not reaching the adequate supply of nutrients to support maternal and infant health. Micronutrient deficiencies are common among women in South Asia.[14] Maternal supplementation trials in some studies have been shown to reduce low birth weight and preterm birth. [15]The combination of folic acid and iron or the multiple micronutrient supplements reduced the risk of low birth weight by 16 and 14%, respectively.[1]Among the macronutrients, protein requires more attention during pregnancy, when demand progressively increases to support protein synthesis, in order to maintain maternal tissues and fetal growth, especially during the third trimester. An excessively low intake of protein is associated with potentially negative effects in terms of weight and length of the foetus at birth.[17]The protein quality of foods is measured by their PDCAAS (Protein Digestibility Corrected Amino Acid Score), which is the score for amino acid digestibility. [18]Values close to 1 are typical of animal products, providing all nine essential amino acids, while values below 0.7 are typical of plant products. However, the consumption of two or more vegetable foods with different amino acidic composition can help improving the overall quality of their protein component.[1]Foetal growth rate has shown some definite relation with maternal age, so even with adequate weight gain in the early months of pregnancy, it seem that teenagers metabolism is not able to properly mobilize their fat storage during the prenatal period, which is necessary to maintain optimal fetal growth. This is a kind of "nutritional competition" with the fetus, probably related to rapid growth and hormonal changes associated with an increased requirement for macro and micronutrients during pregnancy pregnant women require an increased intake of protein during pregnancy. Amino acids are actively transported across the placenta to fulfill the needs of the developing foetus. During pregnancy, protein catabolism is decreased as fat stores are used to provide for energy metabolism. Amino acid supplementation during late trimester of pregnancy appeared to have the greatest beneficial effect on both foetal weight gain and AFI. But as the pregnancy progresses, mechanical changes in the alimentary tract also occur, caused by the growing uterus. The stomach is increasingly displaced upwards, leading to an altered axis and increased intra-gastric pressure. The oesophageal sphincter tone is also decreased and these factors may predispose to symptoms of reflux, as well as nausea and vomiting.[21] Also because of changes in oestrogen and progesterone levels which influence the structural alterations in the gastrointestinal tract. These include abnormalities in gastric neural activity and smooth muscle function, leading to gastric dysrhythmia or gastroparesis.[22]Improvement in maternal nutritional status and weight gain in pregnancy is associated with better pregnancy outcomes. Significant Improvement in AFI by intravenous amino acid infusion in comparison to oral supplementation appears due to improved maternal nutritional status better in group –A due to absence on bypassing factors which are encountered during oral route

This study provides unique data on the effects of manner of supplementation of essential nutrients during 3rd trimester of pregnancy on their efficacy on increase in AFI and in improving peri-natal outcome. Our study was limited by absence of much variation in different parameters, among study groups.

VI. Conclusion

Both intravenous amino acid infusion and oral amino acid supplementation cause improvement in amniotic fluid index accelerated foetal weight gain during 3rd trimester of pregnancy and indirectly improvement in BPP. These positive outcomes are more pronounced in groups with intravenous infusion. So through present study, it is concluded that for oligohydromnios due to maternal nutrients deficiency or idiopathic Oligohydramnios intravenous amino acid infusion may prove useful in improving AFI, EFW and ultimately peri-natal outcome more than oral amino acid supplementation.

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