

Birth Weight Variation between the First and the Second Twin in Spontaneously Conceived Twin Pregnancies Delivered in Alex Ekwueme Federal University Teaching Hospital Abakaliki: A 5-year Retrospective Study

Uche-Nwidagu Bridget Nkiruka, Nwafor Johnbosco Ifunanya*, Onyema Malachy Chizoba, Oliobi Wendy Chinwe, Okoye Paschal Chijioke, Nweke Assumpta Nnenna

Department of Obstetrics and Gynaecology, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Nigeria
*Corresponding author: nwaforjohnbosco97@gmail.com

Received July 10, 2019; Revised August 19, 2019; Accepted August 28, 2019

Abstract Background: Twin pregnancies are associated with disturbed fetal growth. Studies have shown reduced fetal growth, compared to singletons, and also differences in birth weight between first and second twin. Hence, there is a need to evaluate this outcome among twin pregnancies delivered in our hospital. **Aim:** To determine the birth weight variation between the first and second twin in spontaneously conceived twin pregnancies delivered at the Alex Ekwueme Federal University Teaching Hospital Abakaliki. **Materials and Methods:** This was a 5-year retrospective study undertaken between January 2012 and December 31 2016 at our hospital. The study cohorts were parturients who were delivered twin pregnancies that were spontaneously conceived. Data collection was done using a pre-designed proforma; analysis was done using SPSS version 20. **Result:** During the study period, there were 11,932 deliveries and 378 were spontaneously conceived twin deliveries. This accounted for 3.2% of all hospital deliveries. The peak age group for twin gestation was 21-34 years 319(84.4%), 262(69.3%) were booked. Primigravidae were 101 (26.7%) while multiparas were 207 (54.8%) and grandmultiparas; 70 (18.5%). Those delivered through caesarean section were 186 (49.2%) while 176(42.0%) were delivered through the vaginal route. The Apgar score for the first twin in the first and fifth minute respectively were good in 287(75.9%) while in the second twin, 260(68.8%) suffered no asphyxia. Males were more in the first, 211 (58.8%) as well as in the second twins 209(55.3%). The mean birth weight of the first twin was 2.39kg while the mean birth weight of the second twin was 2.36kg. The first twin therefore weighed heavier than the second twin by 30g. **Conclusion:** Birth weight between the first and the second twin can vary depending on the gestational age, the socio-demographic status and the sex of the fetuses.

Keywords: birth weight, variation, first twin, second twin, Abakaliki

Cite This Article: Uche-Nwidagu Bridget Nkiruka, Nwafor Johnbosco Ifunanya, Onyema Malachy Chizoba, Oliobi Wendy Chinwe, Okoye Paschal Chijioke, and Nweke Assumpta Nnenna, "Birth Weight Variation between the First and the Second Twin in Spontaneously Conceived Twin Pregnancies Delivered in Alex Ekwueme Federal University Teaching Hospital Abakaliki: A 5-year Retrospective Study." *American Journal of Medical Sciences and Medicine*, vol. 7, no. 3 (2019): 54-59. doi: 10.12691/ajmsm-7-3-1.

1. Introduction

Twin pregnancy is the development of two fetuses at the same time in a pregnancy [1]. Twin gestation can be of two types; monozygotic twins and dizygotic twins. Monozygotic twins occur in 1 in 250 births and are independent of race, heredity, age and parity. Dizygotic twinning however, is affected by each of these factors and also by use of fertility drugs. A woman who is a dizygotic twin is twice as likely to give birth to dizygotic twins [2].

They can be of different sexes or the same sex. In dizygotic twin, the two embryos have separate placenta and there is no communication between the fetal vessels of the two embryos. Their birth weight may vary or may be same while in monozygotic twins, they are more likely to be of the same weight compared to dizygotic twins [3].

The incidence of twin gestation has risen significantly over several decades, primarily due to increased use of fertility drugs for ovulation induction, superovulation, and assisted reproductive technologies (ART) such as in vitro fertilization [4]. Earlier and more precise sonography has revealed the incidence of multiple gestation to be

3.29-3.39% before 12 weeks gestation. However, in over 20% of such cases, one or more of the pregnancies spontaneously disappears (“vanishing twin”) [5]. Approximately, 2/3rd of twin pregnancies end in a singleton birth; the other embryo is lost from bleeding, absorbed within the first 10 weeks of pregnancy or is retained and becomes mummified [2,5].

The incidence varies among different countries and ethnic groups, with the incidence being highest in African countries, lowest in Japan and Intermediate in caucasians [1,5]. Among Africans, the incidence is highest in Nigeria and among the Yorubas of the south west regions of the country. It occurs in 1 per100pregnancies among white women, 1 in 80 pregnancies among black women and 1 in 155 pregnancies among Asian women [1,5]. Among the yorubas, the prevalent rate of twin gestation was reported as 53 per 1000 deliveries and 27.6 per 1000 birth in south eastern Nigeria, 14.9 per 1000 birth in North eastern Nigeria, 12.1 per 1000 deliveries in United Kingdom and 7.1 per 1000 birth in USA [4,5].

It is a high risk pregnancy compared to singleton pregnancies as they are more likely to be complicated by symptoms like nausea and vomiting, heartburn, more severe pressure in the pelvis, backache, varicosities, constipation, haemorrhoid, abdominal distension, difficulty in breathing, ankle swelling due to higher levels of circulating hormones. They may also experience pregnancy complications like placenta previa, polyhydramnios, anaemia are also common in twin pregnancy, hypertensive disorders, gestational diabetes mellitus, anaemia, preterm birth, antepartum haemorrhage, postpartum haemorrhage, increase caesarean section rate and maternal and fetal death [6]. Other Fetal complications associated with twin pregnancy include; discordant growth of the twin where there a difference in growth rates between the twins. It could be grade 1 discordant growth which indicates a difference of 15-20% whereas grade 11 discordant growth, indicates a difference of >25% [7]. As a result of discordant growth, there can be discrepancy in the weight of the two twins and a discrepancy of 20% or more is usually considered to be significant [8]. Disparity in the birth weight of the twin may be associated with birth asphyxia especially in the twin with lower birth weight, infections, and retained second twin if the first twin is one with lower birth weight, cerebral palsy and metabolic diseases later in life [4,9]. It has also been noted that there could discordancy in the intra twin weight depending on the gestational age at delivery, the zygosity and the intrapair sexes and also metabolic diseases in the mother like hypertension and diabetes could affect the twin intra pair weight [10-20]. Studies have shown also that twin gestation in multipara show higher weight than twin in primiparas [21]. The cause of discordant growth may include factors like unequal placental mass, genetic syndrome, and twin-twin transfusion syndrome which is limited to monochorionic twins while discordant growth due to unequal placental mass or genetic syndrome can occur in both monochorionic and dichorionic twins [22]. Therefore, the aim of this study is to determine the birth weight variation between the first and the second twin in spontaneously conceived twin pregnancies delivered at the Alex Ekwueme Federal University Teaching Hospital Abakaliki.

2. Materials and Method

This was a 5 year retrospective study of birth weight variations in spontaneously conceived twin pregnancies between 1st January 2012 to 31st December, 2016 at the Obstetrics and Gynaecology department of the Alex Ekwueme Federal University Teaching Hospital, Abakaliki. The hospital is a tertiary hospital located at the centre of the state capital of Ebonyi State; the department runs gynecological clinics, gynaecological emergency, antenatal, intrapartum, and postnatal services. It is also a referral centre for the surrounding maternities and hospitals and also receives referral from surrounding states; Cross Rivers, Enugu, and Benue states. Ebonyi state is one of five states in the south eastern geopolitical zones in Nigeria. The state consists of thirteen Local Government Areas, with each Local Government having a General Hospital and a few missionary hospitals. It has an estimated population of 2.1 million people and lie at between 7°3' N longitude and 5° 4' E latitude with a land mass approximately 5,932 square kilometers 6.

Information on the Biodata, gestational age, parity, mode of delivery, Apgar scores, birth weight of the first and second twins respectively, head circumference of the twins length of the twins and the placental weight were retrieved. Women who had incomplete data were excluded from the study. Data analysis was done using SPSS version 20. The results were expressed as frequency tables, percentages, mean and standard deviation. Associations between categorical data were analyzed using Chi square (X^2), while continuous variables were analysed using the Student t test, with a p-value < 0.05 considered statistically significant. Ethical clearance was sought and obtained from the Health Research and Ethics committee of the Alex Ekwueme Federal University Teaching Hospital, Abakaliki.

3. Results

Over the study period, there were a total of 11,932 deliveries, 378 of them were spontaneously conceived twin deliveries. This gives an incidence of 3.2% of total deliveries in the study. The mean age was 28.87±4.70 years, modal age group 241 (63.8%) was 21-30 years. Majority 262(69.3%) were booked while 116 (30.7%) were unbooked. The incidence is more among multiparae 207 (54.8%). 373 (98.1%) were Christians while 234 (61.9%) lived in the urban area. (Table 1).

Table 2 represents the Obstetric parameters. Most of the twins were 279 (73.8%) delivered between 34 weeks and less than 40 weeks of gestation while 53(14.0%) delivered between 28 weeks and 34 weeks. Caesarean section was the route of delivery in 186(49.2%) while 190 (49.3%) were delivered by the vaginal route. Among them, vacuum was required in 14(3.7%) while 2(0.5%) had vaginal delivery for the first twin and caesarean section for the second twin.

At delivery 211 (55.8%) of the first twin were males while 167 (44.2) of the first twin were females. In the second twin 209 (55.3%) were males while 169 (44.7%) were females in the second twin. The male-male pair were

139 (36.8%) while the female-female pair were 97(25.7%). The mixed sexes had 72 (19.0%) for male-female pair and 70 (18.5%) for female-male pair. The APGAR scores of the first twin, 287 (75.9%) showed no asphyxia, 53 (14.0%) showed moderate asphyxia while 22(5.8%) had severe asphyxia and 16 (4.2%) had no life at all. Among the second twins, 260 (68.8%) of the babies had no asphyxia, 68 (18.0%) had moderate asphyxia while 32 (8.5%) had severe asphyxia and 18(4.8%) had no life at all after delivery in the study (Table 3).

Table 1. Socio-demographic characteristics of the study cohorts

Parameter	Frequency	Percentage
Age		
≤20	13	3.4%
21-34	319	84.4%
≥35	46	12.2%
Booking status		
Booked	262	69.3%
Unbooked	116	30.7%
Parity		
0	101	26.7%
1-4	207	54.8%
≥5	70	18.5%
Religion		
Christian	373	98.7
Muslim	4	1.1
Traditional	1	0.2
Area of residence		
Rural	144	38.1
Urban	234	61.9

The total number of the first twin that weighed less than 2.5kg is 188(49.7%) while 41(10.8%) weighed 2.5kg and 149(39.4%) weighed greater than 2.5kg. The number of the second twin than weighed less than 2.5kg is 187(49.5%), 33(8.7%) weighed 2.5kg while 158(41.8%) weighed above 2.5kg.

Table 3 showed the birth weight variations. The mean weight of the first twin is 2.39kg while the mean weight of the second twin is 2.36kg. Among the male-male pair, the mean birth weight for the first twin was 2.36±0.65 kg while the second twin weighed 2.32±0.64 kg and among the female-female pair the mean birth weight of the first twin was 2.36±0.56 kg while the second twin was 2.35±0.51kg.

These were not statistically significant. Among the mixed sexes, the first twin of the male-female pair weighed 2.41±0.60kg and the second twin, 2.20±0.60 and this was found to be statistically significant. The female-male pair had the first weighed 2.48±0.41 while the second was 2.62±0.45 and was not statistically significant.

Table 2. Obstetric parameters of the participants

Obstetric parameter	Frequency	Percentage
Gestational age at delivery		
< 28 weeks	9	2.4%
28 - <34 weeks	53	14.0%
34 - <40 weeks	279	73.8%
≥40 weeks	37	9.8%
Mode of delivery		
Spontaneous vaginal	176	46.6%
Vacuum	14	3.7%
Caesarean section	186	49.2%
Retained second twin	2	0.5%
Birth weight in Kg		
<1.5		
First twin	25	6.6%
Second twin	32	8.5%
1.5-2.5		
First twin	204	54.0%
Second twin	188	49.7%
>2.5		
First twin	149	39.4%
Second twin	158	41.8%
Sex of the twin		
First twin		
Male	211	55.8
Female	167	44.2
Second twin		
Male	209	55.3
Female	169	44.7
Sex pair		
Male-Male	139	36.8%
Female-Female	97	25.7%
Male-Female	72	19.0%
Female-Male	70	18.5%
Apgar scores		
First twin		
No asphyxia	287	75.9%
Second twin		
No asphyxia	262	69.3%
First twin		
Moderate asphyxia	53	14.0%
Second twin		
Moderate asphyxia	68	18.0%
First twin		
Severe asphyxia	22	5.8%
Second twin		
Severe asphyxia	29	7.7%
First twin		
Still birth	16	4.2%
Second twin		
Still birth	19	5.0%

Table 3. Birth weight variation among twins at birth

Parameters	Mean birth weight (kg) First twin	Mean birth weight (kg) Second twin	T Test	P value
Twin Pairs				
Male-Male	2.36±0.65	2.32±0.64	0.5170	0.6056
Female-Female	2.36±0.56	3.35±0.51	0.1300	0.8967
Male-Female	2.41±0.60	2.20±0.60	2.1000	0.0375
Female-Male	2.48±0.41	2.62±0.45	1.9241	0.0564
Twin mean weight	2.39±0.57	2.36±0.58	First twin= 0.9459 Second twin= 0.7172	First twin= 0.3978 Second twin= 0.4734

Table 4. Birth weight in Kilogram by obstetric parameters

Parameters	Booked	Unbooked	T Test	P value
First twin	2.49±0.55	2.18±0.58	4.9695	<0.0001
Second twin	2.46±0.56	2.15±0.62	4.8007	<0.001
	Vaginal delivery	Caesarean section		
First twin	2.29±0.65	2.5±0.48	3.5577	0.004
Second twin	2.24±0.66	2.5±0.49	4.3299	<0.001
	Para 0	≥Para 1		
First twin	2.26±0.61	2.46±0.57	2.9620	0.0033
Second twin	2.27±0.59	2.43±0.50	2.6197	0.0092

Table 4 showed the Birth weight by Obstetrics parameters. The twins of the booked were found to be heavier than the unbooked with the first twin of the booked weighing 2.49±0.55 kg and second weighing 2.46±0.54 kg while in the unbooked, the first twin weighed 2.18±0.58 kg and the second weighed 2.15±0.62 kg. Those that delivered through the caesarean section was found to weigh heavier than those that delivered through the vaginal route. The first and second twins of those who delivered through the abdominal route weighed 2.5±0.48 kg while the first and the second twins of those who delivered through the vaginal route weighed 2.29±0.65 kg and 2.24±0.66 kg respectively. Nulliparae were found to deliver twins who were less than those delivered by primigravidae and multiparae.

4. Discussion

The incidence of twin delivery in this study was 3.2% of all deliveries which is similar to 3.1% found in other studies [6,23]. Mothers who are in the age range of 21 years to 34 years gave to birth to twins more, 84.4% compared to women below or at 20 years, 3.4% and those at or above 35 years, 12.2%. The mean age for twin delivery in the study is 28.50 years. This is probable because it is the age group for greater reproductive potentials. This is in contrast to the study in Pakistan where older women gave birth to twin more than the younger ones [24].

Among the parturient, 69.3% were booked and the remainder came as unbooked. Women with twin gestation tend to book their pregnancy more due to the care required for twin delivery. Primigravidae were found to have higher incidence of twin gestation 26.7% more than other parity when evaluated individually but when combined, multipara had higher rate of rate of twins delivery than other parity; 54.8% while grandmultiparous women had lowest incidence for twin delivery; 18.5%. This contradicts the study done in Pakistan where older grandmultiparous women gave birth to twins more than the younger ones [24].

The number of the parturient who delivered twin that are Christian was 98.7% while the remainder were Muslim and traditionalist. This is because the study area was in a place where the predominant religion is Christianity and so majority of the population are Christians. Among the study population, 141(38.1%) lived in the rural area while 61.9% lived in the urban area. This might have influenced the booking status of the patient since the area under study was in urban area.

The mean gestational age at delivery of twin in this study was 36.2±1.4 weeks. Those that were born before 28 weeks were 2.4%, 14% were born preterm (28 weeks to <34 weeks). Twins are more likely to be born preterm due

to the pressure of the combined weight on the cervix. This compares with the gestational age at delivery obtained in other studies [25,26]. Those that had their babies through the abdominal route were 49.2% while 46.6% had their delivery through the vaginal route. Among those remaining, 3.7% had their delivery through vacuum assisted vaginal delivery while 0.5% had vaginal delivery for the first twin and caesarean section for the second twin. Most that had abdominal route delivery were because of malpresentation of the first twin, cord prolapse or poor progress of labour while those that had both vaginal delivery and abdominal route combined was because of retained second twin.

Comparing the weight of the first and second twin, among those that weighed less than 1.5kg, 6.6% of the first twin weighed less than 1.5kg while 8.5% of the second twin weighed less than 1.5kg. This implies that the second twin weighed less in this category than the first twin. This is in keeping with the majority of studies that has been done [15,29-33]. For those that weighed between 1.5 and 2.5kg, greater number of the first twin, 54.0% were in this category more than the second twin; 49.7%. The second twin weighed greater than the first twin at a weight greater than 2.5kg. At delivery 55.8% of the first twin were males while 44.2% of the first twin were females. In the second twin 55.3% were males while 44.7% were females in the second twin. The male-male pair was 36.2% and the female-female pair was 25.4%. The remainder was mixed sexes in the study. During the study period, male sex was higher in number than female sexes in the population.

The number of the first twin that had no asphyxia at birth was 75.9% while 69.3% of the second twin had no asphyxia. Moderate asphyxia was seen in 14% of the first twin and 18% of the second twin. Severe asphyxia and still birth were seen in 5.8% and 7.7%, 16(4.2%) and 19(5.0%) of the first and second twin respectively. This shows that more of the second twins had both moderate and severe asphyxia and also more of the second twin had still birth. This may also result from low birth weight associated with twin pregnancy and birth weight of the second twin as was recorded in other study done [26,27].

Comparing the twin pairs with the mean birth weight of the first and second twin, it shows that in male-male pair, the first male was 41.4g heavier than the second twin male. In female-female twin pair, the first twin female weighed 2.362kg while the second twin female weighed 2.356kg giving a mean difference of 5g. While in the mixed sexes, the first twin male in male-female mixture weighed 212g more than the second twin female in the pair and was 220g more than second twin male in female-male pair while the first twin female in female-male pair weighed 144g less

than the second twin male in the pair but was 288g heavier than the second twin female in the male-female twin pair. It was also observed that the male in mixed sex pairs weigh heavier than the males in same sex pair while the females in same sex pairs weigh heavier than the females in mixed sex pair. This demonstrates that sex pairs determine birth weight. This agrees with other studies that has been done [28,29,30]. The gender differences is generally believed to be the result of the effect of androgens on fetal growth. This gender differences in fetal growth is greater between the third trimester and less towards term, with males growing not only more, but earlier than females [31]. In this study however, these differences did not reach statistical significance except for the male-female pair.

Other researchers have demonstrated that females in unlike-gender pairs had higher birth weight than females in like-gender pairs. This is different from what was observed in the study. They found out that birth weight was only 20g heavier for boys and 6g heavier for girls in unlike-gender vs like-gender pairs [32,33,34]

From the study, primigravidae gave birth to twin whose weight were lighter than multipara and grandmultiparous women. This agrees with the study done in Vanderbut University [34]. Booked patient were also found to give birth to twin who were heavier than the twins of the unbooked women. The first twin of the booked were 303g heavier than the first twin of the unbooked women and the second twin weighing 305g heavier than the second twin of the unbooked.

Those who were delivered through caesarean section weighed heavier than those delivered through the vaginal route and the difference is statistically significant.

The mean birth weight of the first twin was 30g heavier than the mean of the second twin but this did not reach statistical significance. This is same with other study done in Abuja and in the Flemish population [33,34], but different from the study done in Port-Harcourt and Abuja [29,34].

5. Conclusion

In conclusion, birth weight between the first and the second twin can vary depending on the gestational age, the socio-demographic status of the parturient and the sex of the fetuses.

Acknowledgements

None.

Conflict of Interest

There are no conflict of interest.

References

- [1] Richa S. Twin Pregnancy. In: Bedside Obstetrics and Gynecology. 1st edn. Jaypee Brothers Medical Publishers. 2010; 89-105.
- [2] Bush MC, Pernoll ML. multiple gestation. In: Current diagnosis and Treatment: Obstetrics and Gynecology. 11 edn. (ed); Alan HD, Nathan L, Langer N, Roman AS. 2010; 301-309.
- [3] Kilby MD, Oepkes D. Multiple Pregnancy. In: Dewhurst's Textbook of Obstetrics and Gynecology. 8th edn (ed) Edmond KD. Blackwell Publishing LTD 2012, 230-246.
- [4] Abudu OO, Anorlu RI. Multiple pregnancy. In: Agboola A. Textbook of Obstetrics and Gynecology for Medical Students. 2nd edn. Heinemann Educational Books 2006: 373-380.
- [5] Onyiriuka AN. Twin Delivery; Incidence and Perinatal outcome in a Nigerian Mission Hospital. Bangladesh Journal of Medical Sciences. 2011; 10(1):45-46.
- [6] Eltahir ME, Gero S. differences in Anthropometric Measurements between Sudanese Newborn twins and Singleton. Twin Research and Human Genetics. 201.(13)1, 88-95.
- [7] Carla RI. The Management of Monochorionic-Diamniotic twins. Vanderbilt University, Nov 30, 2012.
- [8] Jewell SE, Yip R. Increasing Trends in Plural Births in the United States. Obstet Gynecol 1995, 85:229-232.
- [9] Robert V, Mary G, Catherine D. twin birth weight standards. Article in Neonatology. Feb 2007.
- [10] Demanini S, Koo WW, Hochtman EM. Bone lean and fat mass of newborn twins versus singleton. Acta paediatrics, 2006; 59-596.
- [11] Robert CL, Algert CS, Tanya AN, Bowen JR, Shard AW. Pre labour caesarean delivery for twin pregnancies close to term. Association of pre labour delivery with reduced mortality in Twins near term in Obstetrics and Gynecology. 2015; 125: 103-10.
- [12] Sawsan AO, Jacqueline P, Kellie EM, Phyllus G, Cynthia M. Accuracy of Estimating fetal Weight and inter-twin weight discordancy by ultrasound in twin pregnancies in women with increased body mass index, 2014; JOGC, 2015.
- [13] Syeda BM, Sadia K. twin birth weight discordance: Associated factors and outcome. Journal of the college of Physicians and Surgeons. Parkinstan 2010, 20(6): 391-394.
- [14] Cohen SB, Elizur SE, Goldenberg M, Beiner M, Novikov I, Masluach S. et al. outcome of twin pregnancies with extreme weight discordancy. Am J perinatal 2001; 18:427-32.
- [15] Hollier LM, McIntire DD, Leveno KJ. Outcome of Twin pregnancies according to intrapair birth weight differences. Obstet Gynecol 1999; 94:1006-10.
- [16] Strobina DM, Ensminger Kim YJ, Nanda J. Mechanism fo maternal age differences in birth weight. Am J Epidemiol 1995. 142: 504-514.
- [17] Liu YC, Blair EM. Predicted birth weight for singletons and twins. Twin Research 2002; 5:529-537.
- [18] Bleker OP, Breur W, Huidekoper BL. A Study of birth weight, placental weight and mortality of twins as compared to singletons. British Journ of Obs and Gyn. 1979; 86:111-118.
- [19] Min SJ, Luke B, Gillespie B, Min L, Newman RB, Mauldin JG, Wilter FR, Salman FA, O'Sullivan MJ. Birth weight references for twins. Am J Obstet Gynecol. 2000; 182:1250-1257.
- [20] Onyiriuka An. Low birth weight infants in Twin gestation. Nepal Journal of Obet gynocol. 2011; 15(1): 37-41.
- [21] Onyiriuka AN. Intrapair birth weight discordance in twins. Annals of African Medicine. 2009; (8) 110-114.
- [22] Douglas A, Kenneth YC, Lee DC. The cost of low birth weight. The Quartely journal of Economics 2005; 1031-1083.
- [23] Yoon-mi H, Michelle L, Nicholas GM, Dorret IB, William GL, Matt M et al. a comparison of Twin birth weight data from Australia, the Netherlans, the United States, japan and South Korea: Are Genetic and Environmental Variation in Birth weight similar in Caucasians and East Asia? Twin research and Human Genetics 2005; 8(6):638-648.
- [24] Jonnson M. Induction of Twin pregnancy and the risk of caesarean delivery: a cohort study. Jonnson BMC Pregnancy and Chirldbirth 2015 (115); 136.
- [25] Barbara L, Hediger M, Sung-Joon M, Morton BB, Ruta BM, Gonazalez-Quintero VA et al. gender mix in twins and fetal growth, length of gestation and adult cancer risk. Paediatric and perinatal Epidemiology 2005. Blacwell Publishing LTD (19) 41-47.
- [26] Ernesto F, Rafael G, Jose L, Manuel PPH, Jose LB. perinatal mortality in twin pregnancy. J Perinat Med 1988 (16) 85-91.
- [27] Hawrylysyn PA, Barkin M, Bernstein A, Papsn FR. Twin Pregnancies- A continuing perinatal challenge. Obstet Gynecol 1983 (59)463.
- [28] Bassey G, Inimgba WM. Fetomaternal outcome of twin gestation in Port Harcourt, south-south Nigeria. Niger J Med. 2014 23 (4): 282-7.

- [29] Ibrahim AY, Aiyuba R. twin birth in Kano, Northern Nigeria. *Journ of Pharm.* 2013 3 (1):04-08.
- [30] Akaba GO, Agidi TY, Onofowokan O, Offiong RA, Adewole NO. Review of twin pregnancies in a tertiary Hospital in Abuja, Nigeria. *J Health Popul Nutr.* 2013; 31(2): 272-277.
- [31] Doom ECG, Delbaere I, Martens G, Termarmen G. birth weight for gestational age among Flemish twin population. *Issues in obs, gyn and reproductive health.* 2012; 4(1): 42-49.
- [32] Nakamuro M, Uzuki Y, Inu T. the effect of birth weight; Does fetal origin really matter for long run outcome. *Economics letters.* 2013; 121(1): 53-58.
- [33] Isa I, Oyeyemi A, Obilah A. twin pregnancies in the Niger Delta of Nigeria: a four year review. *Int. J Women Health.* 2012; (4): 245-249.
- [34] Sunday-Adeoye I, Twomey ED, Egwuatu VE. A 20 year review of twin births at Mater Misericordiae Hospital, Afikpo. *South Eastern Nigeria. Niger Journ Clin Pract.* 2008; 11(3): 231-234.



© The Author(s) 2019. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).