

ORIGINAL RESEARCH ARTICLE

Maternal and Fetal Prognosis in Abruptio Placentae at Korle-Bu Teaching Hospital, Ghana

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Abstract

The study provided baseline data of abruptio placentae in Korle-Bu Teaching Hospital (KBTH), Ghana, and gave recommendations to minimize poor outcomes. A prospective cross sectional study was conducted at the Maternity Department of the KBTH between February 2008 and January 2010. Two hundred women with diagnosis of placental abruption were studied using a pretested standardized structured questionnaire. Statistical Package for Social Sciences (SPSS) version 17 was used to analyse the data. Fifteen thousand five hundred and ten (15,510) deliveries were recorded during the study period out of which 1.4% abruptio placentae cases were confirmed. The perinatal and maternal mortality rates were 65% and 2% respectively. The key risk factors identified were low socio-economic status, grandmultiparity and hypertensive disorders in pregnancy. Intrauterine foetal death, (IUFD) and maternal shock were significantly associated with coagulopathy (p= 0.001 and 0.004 respectively). Early diagnoses of placental abruption will significantly improve foetal and maternal survival. (*Afr J Reprod Health* 2014; 18[4]: 115-122).

Keywords: abruptio placentae, foetal, maternal, mortality

Résumé

L'étude a fourni des données de base de décollement prématuré du placenta au Centre Hospitalier Universitaire de Korle-Bu (CHUK) au Ghana, et a donné des recommandations pour minimiser les mauvais résultats. Une étude transversale prospective a été menée au Département de la maternité de CHUK entre le mois du février 2008 et janvier 2010. Deux cents femmes avec le diagnostic de décollement placentaire ont été étudiées en utilisant un questionnaire structuré pré-testé et normalisé. Le Paquet Statistique pour les sciences économiques (PSPSE) la version 17 a été utilisé pour analyser les données. Quinze mille cinq cent dix (15510) accouchements ont été enregistrés pendant la période d'étude dont 1,4% des cas de décollement placentaire ont été confirmés. Les taux de mortalité périnatale et maternelle étaient de 65% et 2% respectivement. Les principaux facteurs de risque identifiés sont le faible situation socio-économique, une grande multiparité et de l'hypertension pendant la grossesse. La mort intra-utérine du fœtus, (MIUF) et le choc maternel étaient significativement associés à la coagulopathie (p = 0,001 et 0,004 respectivement). Les premiers diagnostics de décollement placentaire s'amélioreront de façon significative la survie fœtale et maternelle. (*Afr J Reprod Health* 2014; 18[4]: 115-122).

Mots clés: décollement prématuré du placenta, fœtus, maternelle, mortalité

Introduction

Abruptio placentae is one of the gravest haemorrhagic complications of pregnancy and together with placenta praevia and post-partum haemorrhage contributes significantly to the unacceptably high maternal mortality ratio of 350/100,000 live births in Ghana¹. An Abruptio placentae is defined as the premature separation of a normally situated placenta from its attachment to

the uterus before the delivery of the baby. The bleeding is revealed in 65-80% of cases and concealed in 20-35% of cases².

Bleeding into the decidua basalis leads to the separation of the placenta from the uterine wall causing compression of these structures which compromise the blood supply to the foetus. Retroplacental blood may penetrate through the thickness of the wall into the peritoneal cavity, a phenomenon known as Couvelaire uterus. The

myometrium in this area becomes weakened and may rupture with increased intra-uterine pressure during contractions². Abruptio placentae are a major cause of third trimester bleeding complicating 0.5-3% of all pregnancies³. A few studies from Africa quoted lower figures, for example Omu *et al* quoted an incidence of 0.42%⁴. Racial difference has been suggested to explain these lower figures⁴. An incidence of 0.5% has also been reported by a Taiwanese study⁵.

A previous study at Korle Bu Teaching Hospital quoted an incidence of 1.1% and nearly 95% resulted in perinatal deaths⁶. The perinatal mortality quoted by Okonofua *et al* (1985)⁷ was 78.9%. In a hospital based study of abruptio placentae in Burkina Faso, Theiba *et al* (2003)⁸ reported maternal mortality rate of 3.9%. Placental abruption accounts for a disproportionately high rate of premature birth, low birth weight; still birth rate and perinatal death⁶.

Although the cause of abruptio placentae is sometimes obvious as in the case of direct trauma to the uterus, sudden uterine decompression and external cephalic version, the primary cause of the majority of placental abruptions remains unknown^{3,6}. Several risk factors have been found to increase the incidence of placental abruption. These are advanced maternal age, diabetes, hypertension, smoking, drug use, racial and socioeconomic factors, preterm pre-labor rupture of the membranes (PRE-PROM), infection, and thrombophilias⁹. The risk of abruptio placentae occurring in a subsequent pregnancy is increased as much as 10 fold¹⁰. High blood pressure is the most common risk factor linked to abruptio placentae¹¹. Several epidemiological studies have also linked advanced maternal age, grand multiparity, cigarette smoking, cocaine use, unmarried status, previous abortions, low socioeconomic status, gestations with male foetuses, gestations occurring at high altitudes and twinning to placental abruption¹².

Abruptio placentae have been found to be the most common cause of consumptive coagulopathy in pregnancy¹³. Tissue damage, anoxia and shock activate the coagulation system which in turn activates fibrinolysis. This results in consumption of platelets and coagulation factors and continuing bleeding causes further depletion of these

haemostatic constituents from the circulation. The aim of this study was to provide baseline data of morbidity and mortality for abruptio placentae in Korle-Bu Teaching Hospital in Ghana and recommend management policies that can best minimize the poor maternal and perinatal outcomes within the limits of peculiar constraints.

Methods

A prospective cross sectional quantitative survey was undertaken at the Maternity department of the Korle Bu Teaching Hospital (a premier referral hospital in Ghana with 2000 bed capacity) from 1st February 2008 to 31st January 2010. The study was conducted on 223 pregnant women who presented to the hospital with diagnosis of placental abruption including those undergoing treatment and those that have been treated and sent to the ward for further management were studied. Patients were excluded from the study if they refused to give informed consent or died before they could be enrolled. A total of 223 cases of confirmed abruptio placentae were diagnosed during the study period out of which 200 were analysed. The remaining 23 were excluded in accordance with the exclusion criteria.

Labour ward records were examined daily to find out any newly diagnosed cases of abruptio placentae undergoing treatment including those already treated within the previous 24hour period and have been sent to the ward. Individual patients were traced using names and folder numbers. Subjects who satisfied the eligibility criteria were enrolled into the study and given consecutive identification numbers. Permission was sought from the labour ward in-charges and various ward heads of the Maternity Department of Korle Bu Teaching Hospital. The subjects were informed of the purpose of the study and their verbal consent obtained before they were interviewed. They were assured that they would not be denied treatment or suffer any penalty if they refuse to participate. The questionnaires were administered one-on-one in privacy in the Wards. The questionnaire was in three sections covering, demographics, clinical presentations and maternal and foetal outcome parameters.

Classification of the severity of the abruptio

placentae depended on the classification by Gauferg V Slava¹⁴ a modification of Sher and Statland criteria for classification of abruptio placentae. Statistical Package for Social Sciences (SPSS) version 17 was used to analyse the data.

Results

Demographic characteristics and clinical presentation

Over all there were 15,510 deliveries during the study period. The number of cases of abruptio placentae diagnosed and managed in the institution over the study period was 223 giving an incidence rate of abruptio placenta of 1.4%. Of these, 200 cases were followed up and analysed. The remaining 23 satisfied the exclusion criteria. Table 1 below shows the age distribution of the cases followed up. The youngest was 18 years and the oldest was 43 years. The majority 112(56.0%) fell in the age bracket 20-29 years. Only 8(4.0%) were teenagers and 6(3.0%) were above 40 years. Of the

women sampled, 78(39.0%) fell within parity 1-2 range. Forty-six (23.0%) of them were nulliparous and only 16(8.0%) were grand multiparous. Seventy-two (36.0%) of the women were traders. Sixty-two (31.0%) of the women had a previous history of antepartum haemorrhage.

Majority 126 (63.0%) did not have any associated hypertensive disorder. Abdominal blunt trauma as a risk factor is relatively low occurring in 14 (7.0%) of the women. Abdominal pain as a clinical presentation, abnormal hypertonic uterine contractions and vaginal bleeding occurred in the proportions 158 (79.0%), 156 (78.0%) and 174 (87.0%) respectively. Abruptio placenta was revealed in majority 166 (83.0%) of the patients whilst the concealed type occurred in 34 (17.0%). The study also indicated that (56.0%) of the neonates were males while 44.0% were females. The classification of severity of abruptio recorded is presented in Table 1 and the details of demographic characteristics and clinical presentation are shown in the Tables 2 and 3.

Table 1: Classification of severity of abruptio

Classification of Severity of abruptio	Number of cases	Percentage (%)
Class 0: Asymptomatic	0	0.0
Class 1: No vaginal bleeding to mild vaginal bleeding, slightly tender uterus, normal maternal B.P and heart rate, no coagulopathy and no foetal distress.	62	31.0
Class 2: No bleeding to moderate vaginal bleeding, moderate to severe uterine tenderness with possible tetanic contractions, maternal tachycardia with orthostatic changes in blood pressure and heart rate, foetal distress and Hypo fibrinogenemia < (50-250mg/dl).	22	11.0
Class 3: Severe abruptio, no vaginal bleeding to heavy vaginal bleeding with very painful tetanic uterus, maternal shock, hypo fibrinogenemia (<150mg/dl), coagulopathy and foetal death.	116	58.0
Total	200	100.0

Major Maternal Outcome

The major maternal outcomes analysed were death, coagulopathy and shock. Out of the 200 women studied, four (2.0%) died, 22 (11.0%) had coagulopathy/DIC and equal number had severe haemorrhagic shock. Majority of the women 136 (68.0%) were in stable cardiovascular condition at the time of diagnosis (Table 4).

Maternal Morbidity Factors

Majority of the patients 78 (39.0%) had mild

pallor. Severe pallor occurred in 48 (24.0%). Post-partum haemorrhage occurred in 40 (20.0%) of the women whilst IUFD occurred in 105 (52.5%) of the women. Hundred and sixty-six (83.0%) of the women were delivered by caesarean section. Acute renal failure occurred in 12 (6.0%) of the patients. Of the complications of caesarean section, persistent bleeding from the wound occurred in 14 (7.0%) whilst wound infection and haemoperitoneum was rare occurring in 2 (1.0%) each. The rest of the details are in Table 5.

Table 2: Demographic characteristics of the women

Characteristics	Frequency (n)	Percentage (%)
Age groups		
<20	8	4.0
20-29	112	56.0
30-39	74	37.0
40+	6	3.0
Total	200	100.0
Occupation		
Unemployed	42	21.0
Petty Traders	72	36.0
Hairdressers	22	11.0
Seamstresses	18	9.0
Others	46	23.0
Total	200	100.0
Parity		
Nulliparous	46	23.0
1-2	78	39.0
3-4	60	30.0
≥5	16	8.0
Total	200	100.0

Table 3: Clinical Presentation of the women

Clinical Presentation	Number of cases (N of 200)	Percentage (%)
Previous History of APH	62	31.0
HPT (Chronic)	126	63.0
HPT- Pre-eclampsia	58	29.0
Pre-existing HPT	4	2.0
Pre-existing HPT + Pre-eclampsia	12	6.0
Eclampsia	2	1.0
Abdominal trauma	14	7.0
Abdominal pain and Uterine tenderness	158	79.0
Abnormal uterine contractions(hypertonia)	156	78.0
Idiopathic premature labour	95	47.5
PROM alone	6	3.0
PROM +	4	2.0
Chorioamnionitis		
Abruptio- Revealed	166	83.0
Abruptio- Concealed	34	17.0

*HPT: Hypertension

*PROM: Premature rupture of the membranes

Table 4: Major maternal outcome

Indicators	Number of cases (n)	Percentage (%)
Maternal mortality		
Death	4	2.0
Survival	196	98.0
Total	200	100.0
Coagulopathy/DIC		
Present	22	11.0
Absent	178	89.0
Total	200	100.0
Maternal condition at diagnosis		
Severe haemorrhage shock	22	11.0
Mid-Mod haemorrhage shock	42	21.0
Stable CVS	136	68.0
Total	200	100.0

Table 5: Maternal morbidity factors

Factors / Levels	Number of cases (N of 200)	Percentage (%)
Pallor		
Mild	78	39.0
Moderate	50	25.0
Severe	48	24.0
Shock		
Stable CVS	136	68.0
Mild to Moderate	42	21.0
Severe	22	11.0
Maternal Morbidity		
PPH	40	20.0
Caesarean section	166	83.0
Severity of Abruptio		
Class 0	0	0.0
Class 1	62	31.0
Class 2	22	11.0
Class 3	116	58.0
Complications		
IUFD	105	52.5
DIC	22	11.0
Acute renal failure	12	6.0
Complications of caesarean sections		
Persistent bleeding from the wound site	14	7.0
Wound infection	2	1.0
Post-operative Haemoperitoneum	2	1.0

Table 6: Causes of foetal morbidity, mortality and birth weight

Causes of foetal morbidity and mortality		
Factors	n	%
Foetal distress	54	27.0
Still birth	114	57.0
Birth Asphyxia	36	18.0
Early neonatal death	16	8.0
Total	200	100.0
Foetal birth weight		
Birth weight	n	%
<2.5 kg	98	49.0
2.5-2.9 kg	58	29.0
3.0-3.4 kg	34	17.0
3.5-3.9 kg	6	3.0
4.0-4.4 kg	2	1.0
4.5 and above	2	1.0
Total	200	100.0

Fetal Morbidity and Mortality Factors

The study indicated that foetal distress occurred in 54 (27.0%) of the babies (Table 6). Hundred and fourteen (57.0%) of the babies were still born.

Birth asphyxia occurred in 36 (18.0%) of the babies of which 16 (8.0%) suffered early neonatal death. Almost half 98 (49.0%) of the babies were of low birth weight <2.5kg. Macrosomia occurred in only 2 (1.0%) of the babies.

Significant indicators of poor maternal outcome (death) and foetal outcome (stillbirth)

The mean total blood loss contributing to maternal death was 2300ml with standard deviation of 424.3. Blood loss significantly contributes to death in abruptio placenta ($p = 0.001$). The mean number of units of blood transfused in those who died was 3.5 units with standard deviation of 0.71. This shows that being transfused or needing on the average 3.5 units of blood significantly put a patient at risk of death. About 10.0% of the 40 who suffered PPH died and 18.2% of the 22 who suffered DIC also died. PPH and DIC were significantly associated with death ($p = 0.004$ and 0.011 respectively).

Table 7: Significant indicators of poor maternal outcome (death) and poor foetal outcome (stillbirth)

Significant indicators of poor maternal outcome (death)					
Indication	N	Percentage %	Mean	Standard Deviation	P-Value
Estimate of total blood loss			2300mls	424.3	0.001
Number of units of blood transfused			3.5	0.7	0.001
PPH	4	10.0			0.004
DIC	4	18.2			0.011
Significant indicators of poor foetal outcome (Still birth)					
Total blood loss			1139mls	570.8	0.001
Retro placental clots			641mls	412.4	0.001
Birth weight			2.21kg	0.7	0.031
			11.28		
Bed side clotting time			mins.	5.6	0.002
Shock	16 (66)	24.0%			0.004
Foetal distress	16 (54)	29.6%			0.001
PPH	38 (40)	95.0%			0.001
Idiopathic premature labour	58 (95)	61.0%			0.021

Total blood loss of 1139 mls with standard deviation of 570.8 from the mother was found to have significantly contributed to the occurrence of stillbirth with $p = 0.001$. The finding of 641ml of retro-placental clots with standard deviation of 412.4 was significantly associated with stillbirth ($p = 0.001$). Birth weight of 2.21kg with standard deviation of 0.67 was significantly associated with stillbirth ($p = 0.031$). Prolongation of bedside clotting time of 11.28min with standard deviation of 5.6 was significantly associated with stillbirth

($p = 0.002$). Shock, foetal distress, PPH, and Idiopathic premature labour have all been found to contribute significantly to the occurrence of stillbirth. About 16 (25.0%) of the cases of stillbirth occurred as a result of shock ($p = 0.004$). About 38 (95.0%) of the cases of stillbirth was significantly due to PPH ($p = 0.001$). Idiopathic premature labour occurring in the mother was found to be significantly associated with 58 (63.0%) of the stillbirth. $p = 0.021$. Details of significant indicators of poor maternal outcome (death) and

foetal outcome (stillbirth) are shown in Table 7.

Intrauterine foetal death, (IUFD) and maternal shock was found to be significantly associated with DIC. The figures are shown in Table 8.

Maternal Factors Affecting Coagulopathy/DIC

Table 8: Maternal factors affecting coagulopathy/ DIC

Factors	no	%	χ^2	p-value
Idiopathic Premature labour	24	25.0	0.77	0.400
IUFD	44	42.0	11.18	0.001
Type of Abruption(Revealed)	44	27.0	2.566	0.109
Presence of pallor	40	23.0	1.379	0.241
Vaginal bleeding	44	25.0	1.847	0.17
Abdominal/back pain /uterine tenderness	40	25.0	0.948	0.330
Abnormal uterine contractions	40	26.0	1.200	0.273
Maternal condition at diagnosis(Shock)	32	50.0	9.421	0.004

Discussion

Abruptio placenta is a very important entity in obstetrics because of the associated adverse effects on maternal and perinatal outcome. It has been estimated to occur in 0.8% to 1.5% of all pregnancies with incidence six times in blacks than whites¹⁵. The incidence in this study was 1.4% (1 in 70). At Korle-Bu Teaching Hospital, the incidence of abruptio placentae from a previous study was approximately 1.1% and nearly 95.0% resulted in neonatal death⁵. The incidence in this present study is high when compared to figures of 0.4% in Sweden¹⁶ and 0.5% in Parkland Hospital in the United States of America¹. In a teaching hospital in Sudan¹⁷ however the incidence of abruptio placentae was 6.5% which was higher than the incidence in most reports.

The stillbirth rate obtained in this study was 57.0% and the perinatal mortality rate was 65.0%. The perinatal mortality rate quoted by Okonofua et al was 78.9% for a study in Nigeria⁶. An American study found 11.9%¹. The significant indicators noted in this study for the perinatal death were average blood loss of more than 1100ml, retroplacental clots in excess of 640ml, bedside clotting time in excess of 11 minutes and idiopathic premature contractions. The mean low birth weight of 2.2kg was found to be a significant risk factor for poor foetal outcome. The mean gestational age at diagnosis of 34.5wk \pm 3.3 however was not found to be significant p = 0.630 and this was surprising. However it could be

explained by inaccurate and poor correlation between gestational age and foetal weight due to poor dating of these pregnancies.

The number of women who presented with IUFD was 105 (52.5%). This figure is higher than the 38.0% reported in the Fourth Perinatal Care Survey 2003¹⁸ in South Africa. Probably, delay in taking the decision to come to hospital and further delay in arrival as well as institutional delays may be partly responsible for the high intra uterine death recorded in this study. Witlin and Sibai (2001)¹⁹ have noted that composite morbidity is increased when the foetus is dead on admission.

The maternal mortality rate obtained in this present study was 2.0%. Thieba et al (2003)⁸, in a hospital based study in Burkina Faso reported a maternal mortality rate of 3.9% which is twice as high. In this study the significant indicators of maternal mortality were mean loss of more than 2300ml of blood, the need for transfusion of at least 3.5units of blood. This simply depicts the direct relationship between blood loss and death. The study also indicated that vaginal bleeding occurred in 87.0% of the women who presented with abruptio. In a study by Hurd et al antepartum haemorrhage has been reported to occur in 78.0% of cases of placental abruption¹².

The current study shows that 83.0% of the placental abruption was revealed while 17.0% was concealed. This is close to values of 65.0 – 80.0% and 20.0 – 35.0% respectively obtained by Morgan et al (2003)². The concealed type comes with a much greater hazard and poorer perinatal outcome

(4, 14). This is due to late detection and hence a larger placental separation and more foetal distress. Vaginal bleeding on the other hand prompts the possibility of abruption and this leads to early diagnosis and intervention. This study also found out that the male birth sex was in the majority, 56.0%. This is consistent with studies done elsewhere. Ananth *et al* reported that in more than 7.6 million US births the proportion of male was 54.6%²⁰. The sex ratio of male to female birth in the general population is considered to be 1.06:1²¹. In Ghana the sex ratio of male to female birth in the general population is 1.03:1²².

The risk factors related to abruptio placentae in this study were low socio economic status, grandmultiparity, hypertensive disorders in pregnancy, sex of the baby, PROM, PROM with chorioamnionitis and abdominal trauma. Though grandmultiparity was noted to be associated with abruptio placentae, this study found that the para 1-2 group was associated with 39.0% of the cases whilst grandmultiparity was associated with only 8.0%. No reasons could easily be assigned to this difference. The chief occupation was petty trading. If petty trading is associated with low socio economic activities then in this study 36.0% belong to the low socio economic status.

Thirty-eight percent of the women had hypertensive disorders in pregnancy, 7.0% had abdominal trauma and an even smaller proportion of 5.0% had PROM. This illustrates that hypertensive disorders in pregnancy seems to be a major risk factor related to abruptio placentae. High blood pressure in pregnancy is the most common risk factor linked to abruptio placentae⁵. Morgan *et al* (1994)²³ concluded in a study that maternal hypertension occurs in approximately 44.0% of all cases of abruptio placentae. The Figure obtained in this study was 7.0% which agrees with the findings obtained by Dahmus and Sibai (1993)²⁴ in which abdominal trauma accounted for 1.5 – 9.4% of cases. It is generally expected that majority of patients will present with class I but findings in this study was contrary to expectation. Majority 58.0% presented with class III abruptio placental and this probably accounted for the high perinatal mortality. The reason could be attributed to the poor health seeking behaviour of the population studied accounting for the high

IUFD rate of 52.5%. The caesarean section rate was 83.0% which was very high. Vaginal delivery is the preferred mode of delivery when the foetus is dead and the mother is stable haemodynamically.

At Korle Bu Teaching Hospital, we maintain a slightly higher tendency towards caesarean section even when the foetus is dead especially if the obstetrician perceives that labour would be prolonged. The aim is usually to shorten the course of disease and prevent worse complications especially DIC. The management policy has not been evaluated and assessed in prospective studies to determine whether more harm than good is being done however in this study the perinatal mortality rate was 65.0% which is an improvement over the 95.0% obtained in earlier study done in the same department⁶. The various delays in seeking health care in developing countries coupled with inadequate institutional preparedness and lack of blood and blood products result in a worse abruptio placentae outcome in developing countries than in the developed countries.

There is the need to diagnose placental abruption early so as to institute appropriate measures to stop further bleeding and prevent mortality. Institutional preparedness and the availability of blood and blood products in the management of abruptio placentae significantly improve foetal and maternal survival.

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Contribution of Authors

JC responsible for concept, design of the manuscript for intellectual presentation, data collection, analysis and preparation. EKS contributed to the concept, analysis and preparation of the manuscript. EKO contributed to the design of the manuscript for intellectual presentation, data analysis and preparation. EKB was involved in the analysis and the preparation of

the manuscript. WKA also participated in the analysis and the preparation of the manuscript.

References

1. UNICEF/UNFPA/WHO. Maternal mortality in 2010. Estimates developed by WHO, UNICEF and UNFPA. Department of Reproductive Health Research. World health organization. Geneva 2012.
2. Morgan K, Arulkumaran S. Antepartum haemorrhage. *Current Obstetrics and Gynaecology* 2003; 13: 18-87
3. Spinillo A., Capuzzo E., Colora L., Solerte L., Nicola S., Guaschino S. Factors associated with abruptio placentae in preterm deliveries. *Acta Obstet Gynecol Scand* 1994 ;73: 307-12
4. Omu A.E., Diejomaoh F.M.E., Racial difference in the etiology of abruptio placentae *International Journal of Obstet Gynecol* 1981; 19:205-210
5. Chang Y.L., Chang S.D., Cheng P.J. Perinatal outcome in patients with placental abruption with and without antenatal haemorrhage. *International Journal of Gynecol and Obstet* 2001; 75: 193-194.
6. Kwawukume E.Y. Ante partum Haemorrhage. In: Kwawukume EY, Emuveyan EE (Eds). *Comprehensive Obstetrics in the tropics* Accra: Asante and Hittscher Printing Press 2002 .pp 140-150.
7. Okonofua F.E., Olatunbosan O.A. Caesarean versus vaginal delivery in abruptio placentae associated with live fetuses. *International journal of Gynecol and Obstetrics* 1985; 23 (6): 471-474.
8. Thieba B., Lankoande J., Akotienga M., Kyelem C., Ouedraogo C.M. Abruptio placenta: epidemiological, clinical and prognostic aspects with respect to 177 case series. *Gynecol Obstet Fertil* 2003; 31(5): 429-33.
9. Oyelese Y, Ananth CV. Placental abruption. *Obstet Gynecol* 2006; 108:1005–1016.
10. Ngeh N., Bhide A. Antepartum haemorrhage. *Current Obstetrics and Gynecology* 2006; 16:79-83.
11. Cunningham F.G. Obstetric haemorrhage In: *William obstetrics* 21st edition. New York: McGraw-Hill; 2001.p.321-630.
12. Hurd W.W., Miodovnik M., Hertzberg V., Lavin J.P. Selection and management of abruptio placentae: a prospective study. *Obstet Gynecol* 1983; 61: 467 – 473
13. Lower T.W., Cunningham F.G. Placental abruption. *Clinic Obstet Gynecol* 1990; 33:406
14. Usui R., Matsubara S., Ohkuchi A. Fetal heart rate patterns reflecting the severity of placental abruption. *Archives of Gynecology and Obstetrics* 2007; 277:249.
15. Ananth C.V., Smulian J.C., Demissie K. Placental abruption among singleton birth in the United States: risk factor profiles 2001;153:721-728.
16. Karegard M., Gennser G. Incidence and recurrence rate of abruptio placentae in
17. Sweden .*Obstet Gynecol* 1986; 57:523 Dafallah S.E., Babikir H.E. Risk factors predisposing to abruptio placenta. *Maternal and foetal outcome. Saudi Medical J* 2004;25(9):1237-40.
18. Mooran N., Mangate H.L. Unexplained still birth. *Saving Babies 2003: Forth Perinatal Care Survey of South Africa* compiled by MRC Research Unit for Maternal and infant Health Care Strategies. Email: matinftru@global.co.za. ISBN: 0-620-32650-6
19. Witlin A.G., Sibai B.M. Perinatal and Maternal outcome following abruption placentae. *Hypertension in pregnancy* 2001; 20 (2); 195 – 203.
20. Ananth C.V., Oyelese Y., Leo L. Pradhham A., Vintzileos A.M. Placental abruption in the United States;1979 through 2001,temporal trends and potential determinants. *Am J Obstet Gynecol.* 2005;192:191-8
21. Devra L.D., Gottlieb M.B., Stampnitzky J.R. Reduced ratio of male to female birth in several industrial countries: A sentinel health indicator? *JAMA* 1998; 1020-1021.
22. Index Mundi. Ghana Demographics Profile 2012. http://www.indexmundi.com/ghana/demographics_profile.html. Date accessed 16/01/2013.
23. Morgan M.A., Berkowitz K.M., Thomas S.J. Abruptio placenta: Perinatal outcome in normotensive and hypertensive patients. *Am Jour. Obstet Gynecol* 1994; 170(6):1595-9.
24. Dahmus M.A., Sibai B.M. Blunt abdominal trauma: are there predictive factorsfor abruptio placentae or maternal and foetal distress? *Am J Obstet Gynecol* 1993; 169(4):1054-9.