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Evaluation of maternal and fetal outcome in patients of abruptio placentae in a tertiary care center, Kolkata: A descriptive and observational study

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ABSTRACT

Background: Placental abruption (PA) contributes almost 30% of the all cases of antepartum hemorrhages. Both mother and fetus are at huge risk of maternal and neonatal morbidity and mortality when mother is complicated by this obstetric condition. **Aims and Objectives:** The aim of this study is to find out the incidence and the fetomaternal outcome in the patients of abruption placenta. **Materials and Methods:** A descriptive and observational study was conducted in the Department of Obstetrics and Gynaecology, in a tertiary teaching hospital in Kolkata, between January 01, 2018 and July 31, 2019, after obtaining ethical approval from the Institutional Ethics and Review Committee of R G Kar Medical College (reference number: RKC/Ethics/05). By convenience sampling method, we included 114 cases with gestational age of 28 completed weeks or more and diagnosed to have abruption placenta either clinically and/or ultrasonically. Statistical Package for the Social Science version 20 was used for analysis. Point estimate at 95% confidence interval was calculated along with frequency, percentage, mean, and standard deviation. **Results:** The mean age of mothers was 25.19 ± 5.56 years. The incidence of PA was found to be 0.99% (1.18–0.8154 at 95% confidence interval) among deliveries conducted in this hospital. The majority of women 78 (68.42%) were mixed type and 57 (50%) found at 36 weeks or more gestational age. Most common presentations were vaginal bleeding 108 (94.74%) followed by pain abdomen 74 (64.91%). Most women 103 (90.35%) underwent cesarean section. Postpartum hemorrhage occurred in 10.53% and 73.68% cases needed blood transfusion. Fetal outcome included preterm (50%) and neonatal intensive care admission (24.56%), still born 6.14%. **Conclusions:** PA is unpredictable and not preventable but morbidity and mortality can be reduced by adequate antenatal care, early detection and monitoring of risk factors, improved nutrition status and multidisciplinary management and timely admission with facilities of neonatal intensive care unit support.

Key words: Abruptio placenta; Maternal and fetal outcome; Preterm

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INTRODUCTION

Abruptio placenta (AP) is the premature separation of normally implanted placenta from the uterine wall, after the period of viability until the second stage of labor and it is responsible for one-third of all antepartum hemorrhages. Placental abruption (PA) is a life-threatening multifactorial obstetric complication whose etiopathogenesis remains unexplained.[1] It is responsible for increased risk of maternal and fetal morbidity and mortality world-wide, especially in the resource-poor settings. It complicates 0.5–1% pregnancies in Western population,[2-4] but the incidence is 4–5% in developing countries.[1,5] It is associated with hypertensive disorders, extreme of maternal age, multi-

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parity, previous PA, scarred uterus, multiple pregnancy, diabetes mellitus, polyhydromnios, premature rupture of membranes, abdominal trauma, and cigarette smoking.[3,6,7] Vaginal bleeding and painful uterine contraction in mid-trimester are the hallmarks. Basis of diagnosis consists of history, clinical examination, and a high index of suspicion aided by ultrasonography which may reveal retroplacental clot, though absence of retroplacental clot does not rule out PA.[8] Despite increased awareness about its association with poor fetomaternal outcome, it remains mostly unpredictable and unpreventable.

Aims and objectives

The aim of this study is to find out incidence, fetal, and maternal outcome of AP in a tertiary hospital with anticipation that the results of this study will help in the better understanding and further management plans of this catastrophic obstetric complication.

MATERIALS AND METHODS

This was a descriptive and observational study, carried out in the Department of Obstetrics and Gynaecology, R. G. Kar Medical College and Hospital, a tertiary care hospital in Kolkata, between January 2018 and July 2109. Ethical clearance was obtained from the Institutional Ethics and Review Committee (Reference Number: RKC/Ethics/05). All the women with gestational age of 28 completed weeks or more and clinical suspicion of abruptio placentae attending out-patient department or emergency in obstetrics department on 3 designated days of a week were included in this study after proper counseling and obtaining informed consent from individual patients. Measures were taken to ensure the confidentiality and privacy of the all study participants, while intervening and examination. The final diagnosis was made by assessing clinical and ultrasonic features. Thus, 128 patients were selected initially with clinical suspicion and out of which 114 finally diagnosed to have abruption placentae and included in the study.

Sample size

Sample size was calculated using the formula,

$n=Z_{\alpha}^{2}pq/L^{2}$, where Z was taken as 1.96, p was the prevalence of abruptio placentae which was 4.4%,[1] q was (1-p) and L was absolute precision taken as 4%. With non-response rate 10%, sample size was calculated to be 111; however, we included 114 patients who met the eligibility criteria. Eligibility of study subjects was set by following inclusion and exclusion criteria. Inclusion criteria were the antenatal mothers having clinical features such as vaginal bleeding, uterine hyper tonicity, and tenderness and confirmed by visual examination of separated placenta immediate after delivery to note the presence of retroplacental clot. Exclusion criteria were pregnancy <28 weeks of gestation, diagnosed placenta previa, lower genital pathology, bleeding disorders, multiple pregnancy, pregnancy with gestational diabetes, and patients with missing records were excluded from our study.

Data collection and procedure

The data were collected with the help of a pretested, predesigned semi-structured schedule from maternity register (log book of labor room), and patient bed head tickets and also examination of the patients in antenatal, intranatal, and postnatal period. The schedule was prepared with the help of guide and literature review and pretested among 10 mothers of abruptio placentae admitted under different units and modified accordingly.

Sociodemographic status along with clinical informations such as maternal age, gravida, parity, antenatal booking status, gestational age during delivery, birth weight, premature rupture of membranes, hypertension, past and current obstetric and medical history, clinical, and per-speculam and per vaginal findings of current pregnancy were noted.

Management

General management includes that correction of shock was done by blood transfusion and monitoring of vitals including urine output and central venous pressure was made. Management of other complications such as disseminated intravascular coagulation (DIC) is done by whole blood transfusion and by hastening delivery. Renal failure was treated by correcting hypovolemia with blood colloids, crystalloids, by fluid challenge test, monitoring urine output, correction of electrolyte imbalance, and managing fluid balance depending on the stage of renal failure with or without dialysis. Obstetric management includes vaginal delivery and caesarean section (CS) was done when indicated. Fetal heart sounds (FHSs) when present were well monitored. Artificial rupture of membranes was done even when Bishop's score was <6 and accelerated with oxytocin when there is no contraindication for induction of labor. Second stage of labor was cut short if necessary and prophylactic methyle ergometrine was given and care was taken to prevent postpartum hemorrhage (PPH). Emergency CS was done if induction failed within 6–8 h of it, general condition deteriorates in spite of blood transfusion, and fetus is mature, alive, and is in distress.

Maternal outcome such as mode of delivery, PPH, requirement of blood transfusion, DIC, shock, and admission in intensive care unit was recorded. The outcome of newborn was assessed by preterm birth, reduced Apgar

score, admission to neonatal intensive care unit (NICU), and perinatal death.

Statistical analysis

Collected data were entered into Microsoft Office Excel and then transferred into the SPSS software version20.0 (Chicago, Illinois, USA). Descriptive statistics were used. Categorical data were expressed by frequency and percentage. Appropriate bivariate analysis was performed using Chi-square test to find out the association between various sociodemographic factors and knowledge attitude and practice of study subjects. $P<0.05$ was taken as significant. Point estimate at 95% confidence interval was calculated along with frequency, percentage, mean, and standard deviation.

RESULTS

Over the study period, total 11427 deliveries were conducted during three designated outpatient department days. Out of which 114 cases were diagnosed as AP. Prevalence of abruption placentae among the cases delivered in our study was found to be 0.99% (1.18–0.815 at 95% confidence interval).

We found that the highest incidence (66.67%) was found in 20–30 years age group. Meanwhile the incidence below 20 years was 22.81% and that above 30 was 10.53%. Mean maternal age of study participants was 25.19±5.57 with a range from 17 to 38 years. It was observed that the number of abruption is higher in unbooked cases, accounting for 108 (94.74%) while the booked cases were only accounting for 5.26% of the cases. Hence, the AP is an accidental hemorrhage in true sense with few warning signs. The most common type of abruption was mixed type 78 (68.42%). The lowest incidence was of concealed type. The majority of abruptio placentae were ultrasound (USG) undiagnosed probably due to its abrupt occurrence. Maximum number of cases 74 (91.22%) had intact membranes at admission and most of them in latent phase of labor whereas 8.77% had premature rupture of membranes. The incidence of abruption was highest among multigravida comprising of 94 (82.46%). The incidence of abruption among women who had never delivered a child beyond the period of viability was 7.54%. It is seen that two-third of the cases of abruption occurred in the multiparous patients (Table 1).

We observed that the predominant symptom with which the patient presented was vaginal bleeding 108 (94.74%). The next common presentation was pain abdomen 74 (64.91%) and tense uterus 51 (44.74%). Among the signs of PA, we found uterine tenderness in 36 (31.58%), FHS was absent in 7 (6.14%), shock was present in 22 (19.30%), hypertension in 56 (49.12%), and pallor in 91 (79.82%) cases. Majority 75 (65.79%) of the cases showed negative urine protein in spite of edema as probably, it was caused due to anemia. The maximum cases 105 (92.11%) were found to have retroplacental clot weighing 150–500 g. Those with more than 500 g were about 7.89% and fetal demise was a rule (Table 2).

In our study, we observed that pregnant women with abruptio placentae were at higher risk for developing complication such as PPH 12 (0.88%), DIC 18 (15.79%), acute kidney injury (AKI) 6 (5.26%), shock 10 (8.77%), wound gap 02 (1.75%), and mortality in 1 (0.88%). All the patients with shock were treated with whole blood transfusion, colloids, and crystalloids. In the present study, 73.68% of the cases of AP required transfusion of blood

Table 1: Background characteristics of the study population (n=114)

Background characteristics	n (%)
Maternal age	
<20 years	26 (22.31)
20–30 years	76 (66.67)
>30 years	12 (10.53)
Mean(±SD) maternal age in years*	25.19±5.57
Gravidity	
Primigravida	20 (17.54)
Multigravida	94 (82.46)
Antenatal Care	
Booked	06 (5.26)
Unbooked	108 (94.74)
Type of Abruptio Placentae	
Mixed	78 (68.42)
Revealed	22 (19.30)
Concealed	14 (12.28)
Diagnosis based on USG	
Yes	6 (5.26)
No	108 (94.74)
Premature rupture of membranes	
Yes	10 (8.77)
No	104 (91.22)

*SD: Standard deviation

Table 2: Clinical presentations of the study population (n=114)

Signs/Symptoms	n (%)
Vaginal Bleeding	108 (94.74)
Pain Abdomen	74 (64.91)
Tense Uterus	51 (44.74)
Tender Uterus	36 (31.58)
Absent FHS	7 (6.14)
Loss of fetal movement	39 (34.21)
Shock	22 (19.30)
Hypertension	56 (49.12)
Anemia	91 (79.82)
Retroplacental Clot	
<500 g	105 (92.11)
>500 g	9 (7.89)
Urine Protein	
Positive	39 (34.21)
Negative	75 (65.79)

and blood products. One patient (0.88%) required obstetric hysterectomy (Table 3).

Abruptio was associated with various perinatal morbidity and mortality. We found that 107 (93.86%) live births and 7 (6.14%) still births in this study. There were 57 (50%) preterm deliveries. It is observed that complications seen in neonatal period were mostly due to prematurity. We found that 50% AP were of 36 weeks or more and 38.60% of patients were in the gestational age group of 30–36 weeks and 11% belonged to <30 weeks. We also observed that 7 (6.14%) newborns were stillborn and Appearance, Pulse, Grimace, Activity, and Respiration (APGAR) scoring <7 in 1 min was found in 35 (31.70%). In 14 (12.28%) cases, APGAR scoring improved after immediate resuscitation and was handed over to mother postoperatively and 28 (24.56%) babies' APGAR were poor and hence required NICU admission (Table 4).

We observed that 103 (95.35%) mothers were delivered by CS. In 89 cases, CS was done without any trial for vaginal delivery, immediately after admission. Eleven cases (9.65%) had vaginal delivery in our study (Table 5). Incidence of preterm delivery was commonly associated with extreme of maternal ages (<20 years and >30 years) among the study participants (Table 6).

Table 3: Maternal outcome (n=114)

Outcome	n (%)
Mortality	1 (0.88)
PPH	12 (10.52)
Sepsis	5 (4.38)
Shock	10 (8.77)
DIC	18 (15.79)
AKI	6 (5.26)
Obstetric hysterectomy	1 (0.88)
Wound gap	2 (1.75)
Blood transfusion	
Yes	84 (73.68)
No	30 (23.61)
No complications	59 (51.75)

PPH: Postpartum hemorrhage, AKI: Acute kidney injury, DIC: Disseminated intravascular coagulation

Table 4: Fetal outcome (n=114)

Fetal outcome	n (%)
Survivability	
Still born	7 (6.14)
Live birth	107 (93.86)
Preterm	57 (50)
Term	57 (50)
Gestational age at delivery	
<30 weeks	13 (11.40)
30–36 weeks	44 (38.60)
>36 weeks	57 (50)
APGAR Scoring at 1 min	
>7	79 (69.30)
<7	35 (31.70)
Management needed	
Resuscitation	14 (12.28)
NICU admission	28 (24.56)

NICU: Neonatal intensive care unit

DISCUSSION

The prevalence of abruption in our study was 0.99% (1.18–0.815 at 95% confidence interval), which was almost comparable to the other study reports on Western population.[2-4] However, in developing countries, the incidence was as high as 4–5%.[5] Higher incidence (66.67%) was seen in age group 20–30 years and in multigravida mothers (82.46%) as compared to primigravida in our study. P Baumann et al., found in their study that abruption occurred more frequently in older women (≥35 years), but usually this increase had been attributed to multiparity (three or more deliveries) independent of age.[9] The majority of patients with AP were unbooked (94.74%). A similar result was reported in Kano, Northern Nigeria.[6] Incidence of premature rupture of membranes in this study was 8.77%. Approximately 4–12% of patients with preterm premature rupture of the membranes before 37 weeks gestation developed PA.[8] Mixed variety was highest (68.42%) in the present study.

The most common presentation was vaginal bleeding (94.74%) and pain abdomen (64.91%). Those who had pain abdomen also had vaginal bleeding but not vice-versa. This was comparable with the study of Li et al., where vaginal bleeding was found in 35% case and abdominal pain was in 68%.[10] Vaginal bleeding was present in 70–80% of cases in a study by Tikkanen,[11] where it was also shown that uterine tenderness or pain in 66% cases and uterine tonic contraction in 34% case and this finding was in agreement with with the present study where tender uterus was present in 31%. In the present study, 49.2% cases were associated with pregnancy-induced hypertension which is similar to other studies.[7,12] Anemia was present in 79% of cases, but it is very difficult to comment its association with abruption, because the majority of cases were unregistered and prior hemoglobin levels were not known. Some studies reported that association of anemia was 51.4% cases of abruption placentae.[13] Ultrasonographic findings in patients with PA show variabilities depending on the time of abruption, site of abruption, and the location of placenta.[14] In the present study, the majority (94.74%) of abruptio placentae are USG undiagnosed cases probably due to its sudden occurrence and requiring immediate delivery of the fetus.

Table 5: Mode of delivery (n=114)

Mode of delivery	n (%)
Vaginal Delivery	11 (9.65)
Spontaneous	3 (2.63)
Induced	6 (5.27)
Forceps	2 (1.75)
Cesarean section	103 (90.35)

Table 6: Association of fetomaternal outcome with maternal age (n=114)

Maternal age groups	Fetomaternal Outcome		P-value	Remark
Maternal age	Complications resulted	No Complications resulted		
<20 and >30 year	26	22	0.59083	Not significant
20–30 years	32	34		
Maternal age	Blood transfusion	No Blood transfusion		
<20 and >30 years	35	13	0.873896	Not significant
20–30 years	49	17		
Maternal age	Preterm	Term		
<20 years	14	12	0.023311	Significant
20–30 years	32	34		
>30 years	18	4		
Maternal age	Apgar score at 1 min<7	Apgar score at 1 min<7		
<20 and >30 years	14	34	0.420926	Not significant
20–30 years	24	42		

In our study, pregnant women with abruptio placentae developed the complications, such as PPH (0.88%), DIC (15.79%), shock (8.77%), and mortality in 0.88%. Among the all cases of AP, 73.68% of the cases required transfusion of blood and blood products. Compared with women without abruption, those with having abruptio placentae had high risk of antepartum hemorrhage (OR 11.5; 95% CI 6.3–21.2), postpartum hemorrhage (OR 17.9; 95% CI 8.8–36.4), CS delivery (OR 5.6; 95% CI 3.6–8.8), and requirement for blood and blood product transfusions (OR 9.6; 95% CI 6.5–14.10) and highest rate of maternal mortality was reported 1% in the literature.[15] In the present study, the most of the mother were delivered by CS (90.35%) which is supported by other studies.

A study done in USA found that 8.2% of emergency hysterectomies performed due to uncontrolled postpartum bleeding and atonic uterus associated with PA.[16] Some studies have shown that renal insufficiencies ranging between 2% and 6.25% and the presence of a high rate of ICU admission between 1% and 4.5%.[17] Bleeding caused by PA can lead to maternal hypovolemic shock. PA may also be associated with acute renal failure resulting from hypovolemia or DIC.[18] We found maternal shock in 8.77% and AKI in 5.26% and obstetric hysterectomy in 0.88%.

Abruption was found to be associated with various morbidity and mortality of fetus and newborn. A total of 107 (93.86%) live births and 7 (6.14%) still births were observed in the present study. There were 50% preterm deliveries in the present study which is comparable with the study among Peruvian women where 51.4% was reported to be preterm delivery was.[19] The increased risk of delivering a low birth weight baby was about 6-fold in patients with PA and shortage of equipments and lack of newborn care might be reason for birth with low APGAR scores, especially in resource-poor settings.[18] The present study shows that APGAR <7 was 31.7% and NICU admission 24.56%.

PA was highly associated with preterm labor, low birth weight, and fetal demise. Perinatal mortality in a developing country might be up to 60% but in developed countries, perinatal mortality can vary in the range of 9–12%. A study proved that in abruption when the placenta is completely separated, then fetal death is 99%.[20] High perinatal mortality was strongly associated with preterm delivery. As we found, preterm delivery had a good link with extreme of maternal age (<20 years and ≥35 years) which is further reported to be associated with increased frequency of AP in other studies.[21,22]

Limitations of the study

There are some limitations of our study. As it was a hospital-based study and the most of the participants were from similar ethnic background, the findings inferred may not reflect the entire population of India having huge ethnic diversities. As the study was lack of comparison with control group, statistical significance could not be drawn for the risk factors.

CONCLUSIONS

Abruption is still one of the most serious obstetric emergencies. Etiology remains obscure in many cases and often presents without warning. Fortunately, maternal mortality from abruption was reduced considerably due to implementation of good obstetric care and blood transfusion services. However, it is still an important cause of maternal morbidity and mortality and perinatal loss. Delivery of fetus promptly by liberal use of CS has helped us to reduce the maternal mortality rate considerably. Hence, elucidation of precise history, adequate prenatal care, and awareness of pregnant mothers are recommended that can help them to prevent the occurrence of PA which is the principle challenge of the future.

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REFERENCES

1. Mukherjee S, Bawa AK, Sharma S, Nandanwar YS and Gadam M. Retrospective study of risk factors and maternal and fetal outcome in patients with abruptio placentae. J Nat Sci Biol Med. 2014;5(2):425-428.
   https://doi.org/10.4103/0976-9668.136217
2. Pariente G, Wiznitzer A, Sergienko R, Mazor M, Holcberg G and Sheiner E. Placental abruption: Critical analysis of risk factors and perinatal outcomes. J Matern Fetal Neonatal Med. 2011;24(5):698-702.
   https://doi.org/10.3109/14767058.2010.511346
3. Ananth CV, Oyelese Y, Pradhan A and Vintzileos AM. Placental abruption in the United States 1979 through 2001: Temporal trends and potential determinants. Am J Obstet Gynecol. 2005;192(1):191-198.
   https://doi.org/10.1016/j.ajog.2004.05.087
4. Rasmussen S, Irgens LM, Bergsjo P and Dalaker K. The occurrence of placental abruption in Norway 1967-1991. Acta Obstet Gynecol Scand. 1996;75(3):222-228.
   https://doi.org/10.3109/00016349609047091
5. Bibi S, Ghaffar S, Pir MA and Yousfani S. Risk factors and clinical outcome of placental abruption: A retrospective analysis. J Pak Med Assoc. 2009;59(10):672-674.
6. Akadri AA, Ogunsowo KM and Odelola OI. Abruptio placenta: A retrospective analysis in a tertiary hospital, Sagamu, Nigeria. Trop J Obstet Gynaecol. 2018;35(2):142-146.
   https://doi.org/10.4103/TJOG.TJOG_14_18
7. Abdella TN, Sibai BM, Hays JM Jr. and Anderson GD. Relationship of hypertensive disease to abruptio placentae. Obstet Gynecol. 1984;63(3):365-370.
8. Ananth CV, Savitz DA and Williams MA. Placental abruption and its association with hypertension and prolonged rupture of membranes: A methodologic review and meta-analysis. Obstet Gynecol. 1996;88(2):309-318.
   https://doi.org/10.1016/0029-7844(96)00088-9
9. Baumann P, Blackwell SC, Schild C, Berry SM and Friedrich HJ. Mathematic modeling to predict abruptio placentae. Am J Obstet Gynecol. 2000;183(4):815-822.
   https://doi.org/10.1067/mob.2000.108847
10. Li Y, Tian Y, Liu N, Chen Y and Wu F. Analysis of 62 placental abruption cases: Risk factors and clinical outcomes. Taiwan J Obstet Gynecol. 2019;58(2):223-226.
    https://doi.org/10.1016/j.tjog.2019.01.010
11. Tikkanen M. Etiology, clinical manifestations, and prediction of placental abruption. Acta Obstet Gynecol Scand. 2010;89(6):732-740.
    https://doi.org/10.3109/00016341003686081
12. Mukherjee J, Saha SK, Ganguli RP, Sanghamita M, Ghosh RS. A 5 year review of severe abruptio placentae. J Obstet Gynecol Ind. 2003;53(2):149-152.
13. Borah SI, Das P and Hazarika B. A study on maternal and perinatal outcome of abruptio placentae in a tertiary centre. New Indian J OBGYN. 2018;5(1):24-27.
    https://doi.org/10.21276/obgyn.2018.5.1.6
14. Shinde GR, Vaswani BP, Patange R, Laddad MM and Bhosale RB. Diagnostic performance of ultrasonography for detection of abruption and its clinical correlation and maternal and foetal outcome. J Clin of Diagn Res. 2016;10(8):QC04-QC07.
    https://doi.org/10.7860/JCDR/2016/19247/8288
15. Macheku GS, Philemon RN, Oneko O, Mlay PS, Masenga G, Obure J, et al. Frequency, risk factors and feto-maternal outcomes of abruptio placentae in Northern Tanzania: A registry-based retrospective cohort study. BMC Pregnancy Childbirth. 2015;15:242.
    https://doi.org/10.1186/s12884-015-0678-x
16. Bodelon C, Bernade-Ortiz A, Schiff MA and Reed SD. Factors associated with peripartum hysterectomy. Obstet Gynecol. 2009;114(1):115-123.
    https://doi.org/10.1097/AOG.0b013e3181a81cdd
17. Kayani SI, Walkinshaw SA and Preston C. Pregnancy outcome in severe placental abruption. BJOG. 2003;110(7):679-683.
    https://doi.org/10.1046/j.1471-0528.2003.02088.x
18. Tikkanen M. Placental abruption: Epidemiology, risk factors and consequences. Acta Obstet Gynecol Scand. 2011;90(2):140-149.
    https://doi.org/10.1111/j.1600-0412.2010.01030.x
19. Sanchez SE, Pacora PN, Farfan JH, Fernandez A, Qiu C, Ananth CV, et al. Risk factors of abruptio placentae among Peruvian women. Am J Obstet Gynecol. 2006;194(1):225-230.
    https://doi.org/10.1016/j.ajog.2005.05.013
20. Ananth CV, Berkowitz GS, Savitz DA and Lapinski RH. Placental abruption and adverse perinatal outcomes JAMA. 1999;282(17):1646-1651.
    https://doi.org/10.1001/jama.282.17.1646
21. Toivonen S, Heinonen S, Anttila M, Kosma V. and Saarikoski S. Reproductive risk factors, doppler findings, and outcome of affected births in placental abruption: A population-based analysis. Am J Perinatol. 2002;19(8):451-460.
22. Ananth C. Placental Abruption among singleton and twin births in the United States: Risk factor profiles. Am J Epidemiol. 2001;153(8):771-778.
    https://doi.org/10.1093/aje/153.8.771

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SB- Data collection, interpreted the results, review of literature, and manuscript preparation; **AC-** Concept of study and revision of manuscript; **AS-** Concept and design of the study, prepared first draft of manuscript, revision of manuscript, and prepare final manuscript; and **AN-** Coordination and preparation of manuscript and support.

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