DETERMINANTS OF FIRST TRIMESTER SPONTANEOUS ABORTION AMONG PREGNANT WOMEN WHO VISIT YAOUNDÉ HOSPITALS: CASE CONTROL STUDY

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ABSTRACT

INTRODUCTION: Abortion is the termination of pregnancy before the period of fetal viability which is 22 weeks according to the WHO. It can be spontaneous or induced. Spontaneous abortion is one of the most common complications of pregnancy and represent 10 to 20% of pregnancy terminations. The objective of this study was to determine the factors associated with first trimester spontaneous abortion.

METHODS: A case-control study was conducted at the Yaoundé Gyneco-Obstetrics and Pediatrics Hospital and the Yaoundé Central Hospital, concerning women received from December 15, 2017 to June 01, 2018. The cases were women whose pregnancy ended in a miscarriage in the first trimester. The controls were pregnant women beyond 14 weeks of pregnancy. Data were analyzed using Epi Info 3.5.4 software. The search for associations between different variables studied was done by the odds ratio with its 95% confidence interval. P was significant for any value <0.05.

RESULTS: The absence of daily walking (aOR=4.83; CI=1.3417.38; aP=0.0159), having a spouse employed in the private sector (aOR=2.90; CI = 1.51 - 5.58; aP=0.001) , not having had a prenatal check-up (aOR=72.02; CI=7.86 - 659.61; aP<0.001), the occurrence of malaria (aOR=63.11; CI=4.18 - 952.02; aP=0.003), and history of spontaneous abortion in the 1st trimester (aOR=65.01; CI=5.93-711.54; aP=0.001) were independent risk factors of first trimester spontaneous abortion.

CONCLUSION: The absence of daily walk, having a spouse employed in private sector, history of abortion, the absence of prenatal check-up and malaria increased the risk of spontaneous abortion in the first trimester. Screening for these factors and intensifying campaigns for Provider Behavior Change Communication would improve the prognosis of pregnancies.

KEYWORDS: Associated factors, spontaneous abortion, first trimester pregnancy, Yaoundé

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INTRODUCTION

According to the World Health Organization (WHO), abortion is defined as the spontaneous or induced termination of pregnancy, with or without complete expulsion of the product of conception before the period of fetal viability; either less than 22 weeks of pregnancy and/or expulsion of a fetus weighing less than 500g [1]. According to the mechanism of occurrence it can be spontaneous or induced [3]. A spontaneous abortion is a natural termination of pregnancy, before the term of 22 weeks or a fetus weighing less than 500g [2]. Spontaneous abortion is one of the most common complications of pregnancy [4].

Spontaneous abortions represent 10 to 20% of pregnancy terminations. The figures are uncertain, because some women do not realize that they have had an abortion and others do not consult the doctor: abortions of this type usually take place in the first ten weeks after fertilization [1]. First trimester spontaneous abortion affects 25% of women [5]. The rate of spontaneous abortion increases with age, 10% at age 20 and more than 90% beyond 45 years [6]. In France, 12 to 24% of pregnancies or 200,000 women are affected each year [7]. At the Ilorin Teaching Hospital in Nigeria, the prevalence was 4.2% in 2007 [8]. In Cameroon, the results of the Demographic Health Survey (DHS) of 2011 reveals that among women who have already had sexual intercourse, 18% reported having had a spontaneous abortion [9].

Several risk factors have been reported in previous studies including advanced maternal and or paternal age, level of education, social level, previous spontaneous abortion, sedentary lifestyle and strenuous physical activity, tobacco and alcohol consumption, infections and chronic diseases such as diabetes. [10, 11]. As regards complications, 3 main complications of spontaneous abortions have been identified [8]: anemia 12.4%, anemia associated with hypovolaemic shock at 0.3%, and infectious complications at 2.6%. Mortality from early spontaneous abortions was estimated at 0.05-0.22/100,000 [12]. Given this high proportion of maternal complications in our context, its psychological effects and high contribution to maternal mortality, this study aimed and acting from a preventive point, that is first identifying the risk factors of first trimester spontaneous abortions to prevent them.

METHOD

Study setting, design and source population

A case-control study was carried out over 7 months, i.e. from 15 November 2017 to June 15, 2018, in two public hospitals: the Gyneco-Obstetrics and Pediatrics Hospital of Yaounde (HGOPY) and the Central Hospital of Yaoundé (HCY). These two health facilities located in the metropolis of Yaounde, capital of Cameroon. They are reference hospitals whose gynecology and obstetric units each carry out about 350 deliveries per month and also receive several referrals, which allowed us easily reach our sample size. Women who came to the hospital for consultation or who were being referred to the gynecology/obstetrics unit constituted the source population

Sampling technique and procedure

The study population consisted of women admitted to the Gynecology and Obstetrics units of HGOPY and HCY. Sampling was consecutive. From clinical calculation with last menstrual period, women who had described a spontaneous abortion in the first trimester and any woman seen with a pregnancy beyond 14 weeks were included. Not included were any women who had an induced abortion, and/or a spontaneous abortion beyond the 1st trimester. The minimum sample size was calculated using the Schlesselman formula [13]: $n = [(1+r)/r] \times [P(1-P)(Z\alpha 2 + Z\beta^2) / (P1 - P2)^2]$ with n= minimum case size, r = control/case ratio (1 case for 2 controls in our study) = 2/1, p_1 = proportion of main factor in group I, p^2 = proportion of the main factor in the group II, $p = (p_1+p_2)/2$ = average of the proportions, $p1-p^2$ = the difference between the proportions, Zα2 = standardized significance level = 1.96, Zβ = standardized power = 0.84. In considering the

frequency at 50% for the proportion of the main factor in group I and 25% for the proportion of the main factor in group II. p1 = 50% , p 2 = 25% . After numerical application, n = 44.1 or 45 cases for 90 controls. To increase the reliability of our results we recruited all the cases that met our selection criteria, i.e. 79 cases and 138 witnesses.

Data collection procedure

After obtaining ethical clearance and research authorizations from the health facilities' authorities, recruitment was done daily in the 2 gyneco and obstetrics units concerned. Data collection was done by the principal investigator aided by medical students. We also used medical records of patients and registers to complete our information. After explanation of study objectives, verbal or written consent was obtained. For each case (spontaneous abortion in 1st trimester) recruited, we recruited 2 controls (pregnant woman over 14 weeks) that followed. The questionnaire was anonymous, the data was confidential and reserved only for this study. The client was free to withdraw her consent at any time without influencing the rest of her care. Both groups were compared for each variable studied ; sociodemographic, clinical and reproductive variables.

Data processing and analysis

The data collected were entered using Microsoft Excel 2010 software and analyzed using Epi info 3.5.4 software. The tools used to express our results were the number, the frequency, the crude odds ratio (OR) and/or adjusted odds ratio(aOR) with its confidence interval at 95% and P-value. P was significant for any value strictly less than 0.05. Multivariate logistic regression was done to eliminate confounding factors in order to bring out the factors independently associated with 1st trimester abortions.

Operational definitions and data quality assurance

A spontaneous abortion in the 1st trimester was defined in this study as any abortion occurring before 13 complete weeks of amenorrhea which was not induced in any way by the patient herself or any other person.

Induced abortion being illegal in Cameroon, it is possible patients hide the information that they may have induced the abortion. In that case there was no means of ascertaining it. Nevertheless, all patients received in these gynecology and obstetric units are interviewed in private and all possible information is gotten, thus reducing this error.

Ethical approval

Before carrying out our study, we had obtained ethics clearance No. 641 of January 16, 2018 from HGOPY Institutional Ethics and Human Health Research Committee, and No. 1455 CEI-Udo/06/2018/T of June 07, 2018 from the Institutional Ethics Committee of the research for human health from the University of Douala, and the authorizations of hospital administration. The informed consent of each participant was required and requested, to avoid violation of their autonomy. The objectives and possible benefits of the study were explained to the participants and their verbal or written consents required prior to enrolment. The questionnaire was anonymous, the data confidential and reserved only for science. The participant was free to withdraw her consent at any time without this influencing the rest of her care.

RESULTS

A total of 208 participants were recruited and analysed; 69 cases and 138 controls. Slightly greater than one thirds of the women were aged between 25 and 30 years old. The majority were catholic Christians. Seventy one percent in the case group had a secondary school education while 47.8% in the control group had a university education. Generally, most of the women were housewives (43.5% case and 29.7% controls). Similarly, the majority were married or in cohabitation. Only 4.3% of cases and 16.7% of controls did prolonged walking daily. The different associations between the variables studied and spontaneous abortion of the 1st trimester were sought in the following tables.

Sociodemographic factors

Sociodemographic factors associated with first trimester spontaneous abortion are shown

in Table 1. Lack of daily walking was the only independent risk factor for abortion Spontaneous 1st trimester: aOR=4.83; CI=1.34-17.38; P=0.0159.

Sociodemographic factors of spouse related to first trimester spontaneous abortion

Sociodemographic factors associated with first trimester spontaneous abortion, related to spouse are represented in Table 2. Having a spouse employed in the private sector independently increased the risk spontaneous abortion of the 1st trimester: aOR=2.90; CI = 1.51 - 5.58; aP=0.001.

Clinical factors.

Clinical factors associated with first trimester spontaneous abortion are shown in table 3. Not having had a prenatal check-up, and the occurrence of malaria increased significantly independently the risk of spontaneous first trimester abortions, with aOR=72.02; CI=7.86 - 659.61; pa<0.001 and aOR=63.11; CI=4.18 - 952.02; Pa=0.003 respectively.

Obstetric factors

Obstetrical factors associated with first trimester abortion are listed in table 4. History of spontaneous abortion in 1st trimester was an independent risk factor of 1st trimester spontaneous abortion: aOR=65.01; CI=5.93-711.54; P=0.001.

DISCUSSION

The profession of the spouse, particularly in the private sector, was associated with spontaneous abortions in first trimester (OR=1.9; CI=1.06-3.43; P=0.02) and after multivariate analysis it was still an independent risk factor of spontaneous abortion of the 1st trimester, with aOR =2.90; CI = 1.51 - 5.58; aP=0.001 (table 2). These results could be justified by the poor working conditions of the partner and the inherent insecurity of the sector which would lead to a stress factor for the partner because of her concern.

Maternal age and first trimester spontaneous abortion were not associated in this study contradicting the results of the study conducted by Maconochie et al in 2007 in England, which found that maternal age was associated with an increased prevalence first trimester spontaneous abortion [10]. This difference may be explained by the higher proportion women aged more than 30 in the later study.

Lack of daily walking was an independentm risk factor for spontaneous abortion of the 1st trimester, with aOR=4.83; CI=1.34-17.38; aP=0.01 59 (table 1). To an extent, this outcome corroborates that of Wong et al in 2010 who found that physical activity protected (sedentary lifestyle increased risk) his participants from first trimester abortions [13]. This could be as a result of comorbidities accentuated by sedentary lifestyle which have adverse effects on pregnancy.

Table 1. Age, religion, level of education, profession, marital status, physical activity, means of movement and consumption of herbal potions associated with first trimester spontaneous abortion

Variable	Case	Control	P	OR (CI 95%)	aP	aOR (CI 95%)
	N=69 (%)	N=138 (%)				
Age (years)						
[15-25]	18 (26.1)	37 (26.8)	0.530	0.96 (0.49-1.85)		
[25-30]	25 (36.2)	46 (33.3)	0.400	1.14 (0.61-2.08)		
[30-35]	14 (20.3)	40 (29)	0.120	0.62 (0.3-1.24)		
[40-50]	3 (4.3)	1 (0.7)	0.110	6.23 (0.65-165.02)		
Religion						
Catholic	47 (68.1)	77 (55.8)	0.060	1.69 (0.92-3.14)		
Protestant	18 (26.1)	45 (32.6)	0.210	0.73 (0.38-1.39)		
Muslim	4 (5.8)	13 (9.4)	0.270	0.59 (0.16-1.82)		
others	0 (0)	3 (2.2)	0.290	0 (0-3.43)		
Level of education						
None	2 (2.9)	2 (1.4)	0.410	2.03 (0.21-19.78)		
Primary	2 (2.9)	10 (7.2)	0.170	0.38 (0.06-1.63)		
Secondary	49 (71)	60 (43.5)	0.000	3.19 (1.71-5.98)	0.084	1.73 (0.92 - 3.24)
university	16 (23.2)	66 (47.8)	0.000	0.33 (0.17-0.63)		
Profession						
Public sector enployee	8 (11.6)	22 (15.9)	0.270	0.69 (0.28-1.62)		
Private sector	14 (20.3)	36 (26.1)	0.230	0.72 (0.35-1.44)		
Farmer	2 (2.9)	1 (0.7)	0.260	4.09 (0.3-121.42)		
Trader	7 (10.1)	8 (5.8)	0.190	1.83 (0.61-5.43)		
student	8 (11.6)	30 (21.7)	0.050	0.47 (0.19-1.07)		
housewife	30 (43.5)	41 (29.7)	0.040	1.82 (0.99-3.32)		
Marital status						
Single	13 (18.8)	29 (21)	0.430	0.87 (0.41-1.8)		
Married	32 (46.4)	56 (40.6)	0.260	1.27 (0.7-2.27)		
widow	1 (1.4)	0 (0)	0.330	-		
Cohabitation	23 (33.3)	53 (38.4)	0.290	0.8 (0.43-1.47)		
Prolonged daily walking						
Yes	3 (4.3)	23 (16.7)	0.010	0.23 (0.05-0.72)		
No	66 (95.7)	115 (83.3)	0.010	4.4 (1.38-18.94)	0.015	4.83 (1.34 - 17.36)
Movement by bike						
Yes	66 (95.7)	115 (83.3)	0.010	4.4 (1.38-18.94)	0.065	3.36 (0.92 - 12.26)
No	3 (4.3)	23 (16.7)	0.010	0.23 (0.05-0.72)		
Daily physical activity						
mild	15 (21.7)	48 (34.8)	0.040	0.52 (0.26-1.01)		
Moderate	51 (73.9)	82 (59.4)	0.030	1.94 (1.03-3.71)	0.243	1.50 (0.75 - 2.98)
Intense	3 (4.3)	8 (5.8)	0.470	0.74 (0.15-2.8)		
Taking herbal potions						
Yes	13 (18,8)	29 (21)	0,430	0,87 (0,41-1,8)		
No	56 (81,2)	109 (79)	0,430	1,15 (0,56-2,44)		

Table 2: Partners age and profession associated with first trimester spontaneous abortion.

Variable	Case	Control	P	OR (CI 95%)	aP	aOR (CI 95%)
	N=69 (%)	N=138 (%)				
Age of partner						
[15-25[	4 (5.8)	3 (2.2)	0.170			
[25-30[	11 (15.9)	21 (15.2)	0.520			
[30-35[	26 (37.7)	42 (30.4)	0.190			
[35-40[	19 (27.5)	45 (32.6)	0.280			
[40-45[	7 (10.1)	21 (15.2)	0.220			
[45-50[	2 (2.9)	3 (2.2)	0.540			
[50-55[	0 (0)	1 (0.7)	0.670			
[55-65[	0 (0)	2 (1.4)	0.440			
Profession of partner						
Public sector	18 (26.1)	41 (29.7)	0.350			
Private sector	39 (56.5)	56 (40.6)	0.020	1.9 (1.06-3.43)	0.001	2.90 (1.51 - 5.58)
Farmer	0 (0)	2 (1.4)	0.440			
Trader	10 (14.5)	27 (19.6)	0.240			
Student	1 (1.4)	10 (7.2)	0.070			
Unemployed	1 (1.4)	2 (1.4)	0.710			

In this study, not having had a prenatal check-up was an independent risk factor for 1st trimester spontaneous abortion, with aOR=72.02; CI=7.86 - 659.61; aP<0.001 (Table 3). In the study by Touré et al in 2010 in Mali, 77.8% of women who had an abortion had not had a prenatal check-up [14]. This can be explained by the fact that during prenatal checkups screening and and treatment of diseases which can potentially cause abortions a done, malaria in pregnancy is an example of such.

Table 3: Desire for pregnancy, Prenatal checkup, Infections in pregnancy, hypertension, history of first trimester metrorrhagia, sickle cell disease, trauma and alcohol consumption associated with first trimester spontaneous abortion

Variable	Case	Control	P	OR (CI 95%)	aP	aOR (CI 95%)
	N=69 (%)	N=138 (%)				
Desire for pregnancy						
Yes	62 (89.9)	121 (87.7)	0.420	1.24 (0.5-3.37)		
No	7 (10.1)	17 (12.3)	0.420	0.80 (0.3-2.01)		
1st trimester metrorrhagia						
Yes	14 (20.3)	16 (11.6)	0.070	1.94 (0,87-4.28)		
No	55 (79.7)	122 (88.4)	0.070	0,52 (0.23-1115)		
Prenatal checkup done in 1st trimester						
Yes	12 (17.4)	135 (97.8)	0.000	0 (0-0.02)	0.000	72.02 (7.86 - 659.61)
No	57 (82.6)	3 (2.2)	0.000	213.75(60.25-915.65)		
Malaria in pregnancy						
Yes	19(27.5)	4 (2.9)	0.000	12.73 (4.3-44.93)	0.003	63.11 (4.18 - 952.02)
No	50(72.5)	134(97.1)	0.000	0.08 (0.02-0.23)		
Urinary tract infection						
Yes	2 (2.9)	2 (1.4)	0.410	2.03 (0.21-19.78)		
No	67(97.1)	136(98.6)	0.410	0.49 (0.05-4.84)		
Bacterial vaginosis						
Yes	2 (2.9)	3 (2.2)	0.540	1.34 (0.16-9.22)		
No	67(97.1)	135(97.8)	0.540	0.74 (0.11-6.4)		
Hypertension						
Yes	1 (1.4)	1 (0.7)	0.560	2.01 (0.05-79.1)		
No	68 (98.6)	137 (99.3)	0.33	0.50 (0.03-8.05)		
Sickle cell disease						
Yes	2 (2.9)	0 (0)	0.110	-		
No	67 (97.1)	138 (100)	0.060	-		
Blood Rhesus						
Rhesus +	69	135	0.147	-		
Rhesus -	0 (0)	3 (2.2)	0.290	0 (0-3.43)		
v**Alcohol consumption**						
Yes	1 (1.4)	4 (2.9)	0.460	0.49 (0.02-4.02)		
No	68 (98.6)	134 (97.1)	0.460	2.03 (0.25-50.92)		
Recent trauma						
Yes	1 (1.4)	0 (0)	0.330	-		
No	68 (98.6)	138 (100)	0.330	-		

Seemingly, the occurrence of malaria was an independent risk factor for 1st trimester spontaneous abortion, with aOR=63.11; CI=4.18 - 952.02; aP=0.003. These results were like those of Keita et al in 2008 who found 26.9% of cases of occurrence of malaria predominantly in all pregnant women [15]. The predominance of malaria in the first trimester of pregnancy could be the reason because the population is in an endemic area and that the control measures such as sleeping under an impregnated mosquito net are sometimes not respected.

History of first trimester spontaneous abortion was an independent risk factor of 1st trimester spontaneous abortion, with aOR=65.01; CI=5.93-711.54; aP=0.001 (Table 4). Maconochie et al also found that the risk increased with each additional abortion [12]. Results corroborate those of Brigham and al in 1999 in England, who had found 24% of women had a history of 2 consecutive spontaneous abortions and 76% with a history of at least 3 consecutive abortions [16]. These results were significantly superior to those of Blohm et al in Sweden in 2008, who found 4% of women who had 2 spontaneous abortions of the first trimester [17]. This rate would probably be underestimated, since many spontaneous abortions occur before the diagnosis of pregnancy, and sometimes before the amenorrhea is not noticed which is an entity that can be included in failures of implantation. Results would explain that women with a history of spontaneous abortion in first trimester, were at risk of having another abortion reason being that these abortions may be caused by chronic maternal conditions.No associations emerged between first trimester spontaneous abortion and the other variables.

Table 4: Gravidity, parity, history of spontaneous or induced abortion, preterm birth, uterine fibroid, ovarian cyst, sexual partners, chlamydia, and HIVassociated with first trimester abortion

Variable	Case	Control	P	OR (CI 95%)	aP	aOR (CI 95%)
	N=69 (%)	N=138 (%)				
Gravidity						
1	16 (23.2)	32 (23.2)	0.570	1 (0.49-1.98)		
2	14 (20.3)	22 (15.9)	0.280	1.34 (0.62-2.82)		
3	14 (20.3)	33 (23.9)	0.340	0.81 (0.39-1.63)		
4	10 (14.5)	25 (18.1)	0.330	0.77 (0.33-1.68)		
≥5	15 (21.7)	26 (18.8)	0.370	1.2 (0.57-2.44)		
Parity						
0	22 (31.9)	40 (29)	0.390	1.15 (0.61-2.14)		
1	16 (23.2)	38 (27.5)	0.310	0.79 (0.4-1.55)		
2	15 (21.7)	31 (22.5)	0.530	0.96 (0.47-1.92)		
3	5 (7.2)	19 (13.8)	0.120	0.49 (0.16-1.33)		
4	8 (11.6)	9 (6.5)	0.160	1.88 (0.66-5.22)		
≥5	3 (4.3)	1 (0.7)	0.110	6.23(0.65-165.02)		
History of spontaneous abortion in 1st trimester						
Yes	66 (95.7)	31 (22.5)	0.000	75.94(24.05-315.19)	0.001	65.01 (5.93 – 711.54)
No	3 (4.3)	107 (77.5)	0.000	0.01 (0-0.04)		
History of spontaneous abortion in 2nd trimester						
Yes	7 (10.1)	11 (8)	0.390	1.3 (0.46-3.54)		
No	62 (89.9)	127 (92)	0.390	0.77 (0.28-2.2)		
History of voluntary termination of pregnancy						
Yes	7 (10.1)	15 (10.9)	0.540	0.93 (0.34-2.37)		
No	62 (89.9)	123 (89.1)	0.540	1.08 (0.42-2.97)		
Previous preterm birth						
Yes	66 (95.7)	128 (92.8)	0.320	1.72 (0.48-7.97)		
No	3 (4.3)	10 (7.2)	0.320	0.58 (0.13-2.09)		
History of twin pregnancy						
Yes	68 (98.6)	134 (97.1)	0.460	2.03 (0.25-50.92)		
No	1 (1.4)	4 (2.9)	0.460	0.49 (0.02-4.02)		
Current number of sexual partners						
1	69 (100)	137 (99,3)	0,670	-		
2	0	1	0,670	0 (0-38)		
Cumulative number of sexual partners						
1	20 (29)	26 (18.8)	0.070	1.76 (0.89-3.45)		
2	12 (17.4)	37 (26.8)	0.090	0.57 (0.27-1.18)		
>2	37 (53.6)	75 (54.3)	0.461	0.97 (0.54-1.73)		
Uterine fibroid						
Yes	11 (15.9)	9 (6.5)	0.030	2.72 (1.05-7.12)		
No	58 (84.1)	129 (93.5)	0.030	0.37 (0.14-0.95)		
Ovarian cyst						
Oui	1 (1,4)	3 (8,7)	0,390	0,66 (0,07-6,48)		
Non	68 (98.6)	135 (91.3)	0.390	1.51 (0.16-40.34)		
Chlamydiae						
Yes	9 (13)	11 (8)	0.180	1.73 (0.66-4.46)		
No	60 (87)	127 (92)	0.180	0.58 (0.22-1.52)		
Human immunodeficiency Virus						
Yes	0 (0)	5 (3.6)	0.130	0 (0-1.63)		
No	69 (100)	133 (96.4)	0.13	-		

CONCLUSION

The independent risk factors for first trimester miscarriages were: The absence of daily walking, having a spouse employed in the private sector, not having a prenatal check-up, the occurrence of malaria and a history of spontaneous abortion in the 1st trimester. Screening for these risk factors, early start of prenatal consultations and the intensification of campaigns for behavioral change would make it possible to improve the prognosis of pregnancies by reducing the rate of abortions in this study context.

DECLARATIONS:

Limits

Study being of the case-control type, makes it possible to strongly suspect a strong link between the variables without, however, establishing a causal relationship. Not only was the type of abortion not fully considered, but there could also be a recall bias. However, we think that the methodology used made it possible to minimize these biases and increase the reliability of our results.

Conflicts of interest

The authors declare no conflict of interest.

Author contributions

Fouelifack Ymele and Bambo Hetcheu designed the study, recruited, analyzed the data and wrote the manuscript. Mosman wrote the manuscript in English. Foumane designed the study and supervised the process until manuscript submission.

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