Predictors of spontaneous abortion among reproductive-aged women at tertiary level hospital, Kathmandu

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Abstract

Introduction: Spontaneous abortion (SA) is one of the adverse outcomes during pregnancy, which is a challenge for maternal well-being. The present study aimed to analyze the predictors of SA among reproductive age women.

Method: A hospital-based case-control study was conducted at Patan hospital, Nepal. The consecutive sampling technique was used to select the cases (84) and a purposive sampling technique was used for controls (168) in a 1:2 ratio. Ethical approval was obtained. Data were collected through face to face interviews using a structured questionnaire. Descriptive and inferential statistics (Chi-square, Fisher exact test, and logistic regression) were used for analyzing the data.

Result: We found that previous history of abortion (OR=3.80, 95% CI=1.8-7.70), heavy lifting (OR=20.45, 95% CI =4.48-93.38), emotional disturbance (OR=10.06, 95% CI=1.06-96.96), health problems (fever of unknown cause and urinary tract infection) during pregnancy (OR=16.53, 95% CI=1.90-143.41), coffee intake (OR=0.36, 95% CI=0.20-0.63), unplanned pregnancy (OR=0.10,95% CI=0.04-0.22), preconception counseling/care not received (OR=6.48, 95% CI=2.18-19.21) were the significant predictors of SA among reproductive age women.

Conclusion: Our findings show that the previous history of abortion, heavy lifting, emotional disturbances, health problems, and coffee intake during pregnancy are the significant cause of SA; and preconception counseling and planned pregnancy are protective factors.

Keywords: predictors, reproductive-aged women, spontaneous abortion

Introduction

Abortion is an important cause of morbidity among women of reproductive age, especially in developing countries, which threatens their well-being and comfort, and may lead to death.[1,2] Spontaneous abortion (SA) is the most common complication (15-20%) during early pregnancy (first trimester).[3-5]

Approximately 10% of abortion occurs in developed countries, 35.5% in developing countries, and 26.8% in Asian countries.[6] Common reasons for SA are genetic abnormalities and maternal disorders. Lifestyle factors such as heavy work, stress, diet, smoking, alcohol intake, and high coffee consumption are other probable risk factors for SA.[7-9] Similarly, maternal age of 35 or above and previous abortion history can increase the risk of SA.[10]

Previous studies in Nepal have focused on induced abortion and unintended pregnancy.[11,12] Other studies conducted on SA have explored only a few risk factors (obesity and smoking).[13,14] Very few in-depth data about risk factors associated with spontaneous abortion in Nepal are available. Some of the risk factors for SA are preventable, and most SA are either managed at home or underreported.[15]

Identification of avoidable risk factors may help to reduce the consequences of SA. Thus, this study aimed to examine the predictors of SA (lifestyle factors, medical and reproductive history, and food-related beliefs) among reproductive-age women at a tertiary level hospital.

Method

A hospital-based, case-control study was conducted to examine the predictors of spontaneous abortion among married women of reproductive age attending the emergency or Obstetrics & Gynecology Department of Patan Hospital, Patan Academy of Health Sciences, Lalitpur, Nepal. A case-control design

with a ratio of 1:2 was used in this study. A total of 252 respondents were included (84 cases and 168 controls). Cases were defined as women who had a recent spontaneous abortion before 22 w of pregnancy and had been hospitalized for a medical procedure or treatment. Controls were women whose pregnancy duration was more than 22w of gestation, and who had visited the antenatal outpatient department (OPD). A consecutive sampling technique was used to select the cases and a purposive sampling technique was used for selecting the controls.

Data were collected after obtaining ethical approval from the Ethical Review Board (ERB), Nepal Health Research Council (NHRC), and Institutional Review Committee (IRC) of PAHS (Ref no. 2254 and nrs1709011134, respectively). Informed consent was obtained from each respondent before data collection. Respondents' participation in the study was voluntary and they were allowed to discontinue the study at any time without giving any reason.

The data were collected from 1 January to 30 December 2018, through face to face interview technique by using the Nepali version of the structured interview schedule. The questionnaires on risk factors were developed based on the review of the literature and categorized as: maternal age, medical and reproductive history, lifestyle factors, and dietary habits. The validity of the instrument was established by consulting with the head of the Department of Obstetrics and Gynecology and subject matter experts and reviewing the related literature.

The collected data were entered into SPSS version 16 and the risk factors were analyzed by using Chi-square or Fisher exact test. The odds ratio with 95% confidence intervals was calculated to estimate the risk ratio between cases and controls. To confirm the predictors of spontaneous abortion, all the factors which were observed as significant were further analyzed using logistic regression.

Result

The mean age of the respondents was 28.36±6.07 y in cases and 26.49y±4.49 in the control group. Regarding education status, 78(93%) respondents in the case group and 155(92.3%) in the control group were literate, 2/3rd of the respondents were housewives in both the groups, Table 1.

Abortion history was given by 32(38.1%) in the case group and 28(16.7%) in the control group; 52(61.9%) had planned pregnancy in the case group and 153(91.1%) in the control group, Table 2.

One-fourth i.e. 22(26.2%) gave a history of the heavy lifting in the case group compared to 3(1.8%) in the control group, i.e. there is a 19.5 times higher chance of SA in women who do the heavy lifting than those who do not (OR=19.5, 95% CI=5.6-67.51). History of longstanding hours was found in 11(13.1%) in the case group and 1(0.6%) in the control group (OR=25.1, 95% CI=3.19-198.52); emotional disturbance was present in 10(11.9%) in the case group compared to 1(0.6%) in the control group (OR 12.5, 95%CI= 2.83-179.51), Table 3.

Food consumption belief and other habits among the case and control group showed a significant association between coffee intake, alcohol intake, and cigarette smoking with SA. Food consumption belief did not show a significant association, Table 4.

Table 1. Socio-demographics of reproductive age women surveyed for spontaneous abortion (N=252)		
Characteristics	Case Group (84) N(%)	Control Group (168) N(%)
Age (in years)		
Mean±SD	28.36±6.07	26.49±4.49
≤ 30	56(66.7)	135(80.4)
>30	28(33.3)	33(19.6)
Educational Status		
Illiterate	6(7.1)	13(7.7)
Literate	78(92.9)	155 (92.3)
If literate, level of Education (N=233)	(n=78	(n=155)
Primary	15(19.2)	7(4.5)
Secondary	30(38.5)	45(29.0)
Higher Secondary	16(20.5)	52(33.5)
Graduate& above	10(12.8)	48(31.0)
Post graduate	7(9.0)	3(1.9)
Occupation		
Agriculture	2(2.4)	7(4.2)
House wife	55(65.5)	113(67.3)
Service	17(20.2)	42(25.0)
Other	10(11.9)	6(3.6)
Family income Nepalese rupees 1000/month		
<20	37(44.0)	25(14.9)
21-40	29(34.5)	84(50.0)
41-60	14(16.7)	55(32.7)
≥61	4(4.8)	4(2.4)

Note: Case Group- women who had a recent spontaneous abortion before 22 w of pregnancy and had been hospitalized for a medical procedure or treatment, Control Group- controls were women whose pregnancy duration was more than 22w of gestation who had visited antenatal OPD.

Table 2. Medical and reproductive history of reproductive age women surveyed for spontaneous abortion (N=252)

Variables	Case Group (84)	Control Group (168)	OR	95% CI	p-value
	N(%)	N(%)			
High BP					
Yes	4(4.8)	0(0)	0.95*	0.90-0.99	0.00
No	80(95.2)	168(100)			
Thyroid dysfunction					
Yes	5(6.0)	2(1.2)	5.25	0.99-27.67	0.03
No	79(94)	166(98.8)			
Previous history of Abortion					
Yes	32(38.1)	28(16.7)	3.07	1.69-5.60	0.00
No	52(61.9)	140(83.3)			
If yes, type of abortion					
Induced	3(9.37)	5(17.9)	0.63	0.15-2.6	0.53
Spontaneous	29(90.62)	23(82.1)			
Current pregnancy					
Planned	52(61.9)	153(91.1)	0.15	0.08-0.31	0.00
Unplanned	32(38.1)	15(8.1)			
Preconception counseling					
Yes	15(17.9)	7(4.2)	5.0	1.95-12.80	0.00
No	69(82.1)	161(95.8)			
Fertility treatment					
Yes	6(7.1)	1(0.6)	12.84	1.5-108.53	0.003
No	78(92.9)	167(99.4)			

*OR-odd ratio was calculated for cohort

Table 3. Risk factors (lifestyle factors) of reproductive age women surveyed for spontaneous abortion (N=252)

Variables	Case group (84)	Control group (168)	Odd Ratio	95% CI	p-value
	N(%)	N(%)			
Heavy lifting					
Yes	22(26.2)	3(1.8)	19.5	5.6-67.51	0.00
No	62(73.8)	165(98.2)			
Long-standing					
Yes	11(13.1)	1(0.6)	25.1	3.19-198.52	0.00
No	73(86.9)	167(99.4)			
Heavy exercise					
Yes	3(3.6)	1(0.6)	6.18	0.66-60.39	0.07
No	81(96.4)	167(99.4)			
Abdominal injury					
Yes	2(2.4)	1(0.6)	4.07	0.36-45.5	0.25
No	82(97.6)	197(99.4)			
Emotional disturbances					
Yes	10(11.9)	1(0.6)	22.5	2.83-179.51	0.00
No	74(88.10	197(99.4)			
Health problem					
Yes	6(7.1)	1(0.6)	12.8	1.52-108.53	0.00
No	78(92.9)	167(99.4)			
Long travel during pregnancy					
Yes	11(13.1)	14(8.3)	1.65	0.71-3.8	0.26
No	73(86.9)	154(91.7)			

Table 4. Risk factors: Lifestyle factors (food habit according to belief, smoking and drinking habit) of reproductive age women surveyed for spontaneous abortion (N=252)

Variables	Case group (84)	Control group (168)	Odd ratio	95% CI	p-value
	N(%)	N(%)			
Papaya intake					
Yes	22(26.2)	33(19.6)	0.68	0.37-1.27	0.23
No	62(73.8)	135(80.4)			
Pineapple intake					
Yes	20(23.8)	25(14.9)	0.55	0.29-1.08	0.08
No	64(76.2)	143(85.1)			
Honey intake					
Yes	10(11.9)	35(20.8)	1.94	0.91-4.15	0.08
No	74(88.1)	133(79.2)			
Sichuan pepper-intake					
Yes	26(31.0)	59(35.1)	1.20	0.68-2.11	0.51
No	58(69.0)	109(64.9)			
Sugarcane intake					
Yes	14(16.7)	44(26.2)	1.77	0.90-3.46	0.09
No	70(83.3)	124(73.8)			
Coffee intake					
Yes	45(53.6)	49(29.2)	0.35	0.20-0.61	0.00
No	39(46.4)	119(70.8)			
Alcohol intake					
Yes	10(11.9)	7(4.2)	0.32	0.11-0.87	0.02
No	74(88.1)	161(95.8)			
Cigarette intake					
Yes	5(6)	1(0.6)	0.09	0.01-0.82	0.00
No	79(94)	167(99.4)			

Table 5. Predictors of spontaneous abortion associated with a medical and reproductive history of reproductive age women (N=252)

Variables	Univariate model OR(95%CI)	p-value	Multivariate model OR(95% CI)	p-value
Age y				
≤30	0.48(0.27-0.88)	0.01	0.91(0.43-1.95)	0.82
>30	1		1	
High BP				
Yes	1		1	0.99
No	0.00(0.00)	0.99	0.00(0.00)	
Thyroid dysfunction				
Yes	1		1	0.21
No	5.25(0.99-27.67)	0.05	3.49(0.47-25.71)	
Previous history of abortion				
Yes	1		1	0.00
No	3.07(1.69-5.60)	0.00	3.80(1.87-7.70)	
Current pregnancy				
Planned	0.15(0.08-0.31)	0.00	0.10(0.04-.22)	0.00
Unplanned	1		1	
Preconception counseling				
Yes	5.00(1.95-12.80)	0.00	6.48(2.18-19.21)	0.00
No	1		1	
Fertility treatment				
Yes	1		1	0.14
No	12.84(1.52-108.53)	0.01	6.20(0.52-73.71)	

Table 6. Predictors of spontaneous abortion associated with lifestyle factors of reproductive age women (N=252)

Variables		Univariate model OR (95% CI)	p-value	Multivariate model OR (95% CI)	p-value
Heavy lifting					
Yes	1		1		
No		29.45(6.72-128.94)	0.00	20.45(4.48-93.38)	0.00
Long Standing					
Yes	1		1		
No		25.16(3.19-198.50)	0.00	7.45(0.73-75.93	0.09
Emotional Disturbances					
Yes	1		1		
No		22.56(2.83-179.51)	0.00	10.06(1.06-96.96)	0.04
Health problem					
Yes	1		1		
No		12.84(1.52-108.53)	0.01	16.53(1.90-143.41)	0.01
Coffee intake					
Yes	1		1		
No		0.35(0.20-0.61)	0.00	0.36(0.20-0.63)	0.00
Alcohol intake					
Yes	1		1		
No		0.32(0.11-0.87)	0.02	0.41(0.13-1.26)	0.12
Cigarette smoking					
Yes	1		1		
No		0.09(0.01-0.82)	0.03	0.17(0.01-1.80)	0.14

Thyroid dysfunction, abortion history, and pregnancy conceived through fertility treatment were significant predictors based on univariate analysis. On multivariate analysis, only previous history of abortion was the significant predictor of SA. Planned pregnancy and preconception counseling were the significant protective factors in both univariate and multivariate analysis, Table 5.

Univariate analysis showed that heavy lifting, long-standing, emotional disturbance, health problems, coffee intake, alcohol intake, and cigarette smoking during pregnancy were the significant predictors of SA. Multivariate analysis showed heavy lifting, emotional disturbance, health problems, and coffee intake were the significant predictors, Table 6.

Discussion

The findings of the present study revealed that maternal age >30y was a significant predictor (OR=0.48, 95% CI 0.27-0.88, p=0.01) of SA in univariate analysis. However, we did not find a significant association between age and SA in multivariate analysis. Studies done in India and Denmark also reported that women aged ≥35y were at higher risk of SA.[16,17] But, a study conducted in UAE did not find a significant association between age and SA.[18] These findings suggest that SA has other underlying causes, which warrant further study.

In this study, we found that previous history of abortion was a significant predictor for SA both in univariate and multivariate analysis. Studies have shown that previous history of abortion either the first time or recurrent miscarries adversely affects the subsequent pregnancy outcomes.[14,19,20] Likewise, a case-control study from the UK also found that previous history of SA was a significant risk factor for SA, and the odds were increased with each additional miscarriage, for example, for one previous miscarriage OR=1.65 (95% CI=1.27-2.13), for two miscarriages OR=2.00 (95% CI=1.31-3.06), and ≥3 miscarriages OR=3.87 (95% CI=2.29-6.54) respectively.[21] Study done in Nepal among the respondents, 32.3% (95% CI=29.6-34.9) had repeated SA.[14] One possible reason for this could be that women were unaware of the consequences of SA and may have thought

it was a single event in their life and possible unavailability of counseling services in the health care facilities before conception. Our study findings also revealed that planned pregnancy and preconception counseling are significant protective factors for SA both in univariate and multivariate analysis.

Our findings from the univariate analysis revealed that thyroid dysfunction was a significant predictor for SA, but not on the multivariate analysis. Other studies have reported thyroid antibodies and miscarriage was associated (OR of 2.73, 95% CI=2.20–3.40).[22] Both hyper and hypothyroidism have been reported as associated factors and increases the risk for early miscarriage.[23] Yet another study reports there was no significant association between impaired thyroid function during pregnancy and risk for SA (p-value=0.67), also they did not find high blood pressure, previous stillbirth, premature delivery, and low birth weight were associated with SA.[5]

In lifestyle factors, emotional disturbance, heavy lifting, long-standing, and health problems during pregnancy were associated with risk for SA as shown in both univariate and multivariate analysis. These findings are consistent with studies conducted in UAE and Japan which reported that women who experience stress, anxiety, traumatic events during pregnancy, long-standing, and physically demanding work may also have a risk of SA.[24,25] In contrast to these findings, there was no evidence suggesting that lifting heavy objects, standing for more than 6h/d, strenuous exercise during pregnancy increases the risk of SA.[5,26] Reason for the differences in various studies could be because of non-standardized measurement of these factors, and also variation in physical tolerance, the types of work, and the possibility of other related risk factors for SA.

Our study also found, with both univariate and multivariate analysis, that lifestyle factors like coffee, alcohol, and cigarette smoking during pregnancy are the significant predictors of SA. Daily caffeine intake of 250mg/d during

pregnancy was reported to be associated with an increased risk of SA compared with women who didn't drink coffee.[8,27] Similarly, women who had ≥4 drinks/w were 2.65 times more likely to have SA compared to women who didn't drink alcohol; and smoking >20 cigarettes/d was associated with early miscarriage.[28] However, some studies didn't find a significant association between coffee intake, smoking 5-10 cigarettes/d, and consumption of alcohol 1-2 drinks/w during pregnancy and SA.[16,29] These differences in the result may be due to recall bias of women because the majority of the studies have been done retrospectively.

Some of the limitations of our study may be we were unable to assess the amount and frequency of alcohol use, cigarette smoking, and coffee intake. Furthermore, there may have been recalled biases from the respondents. For the same reason, the cultural beliefs of the possible effect of the use of selected fruits and herbs like papaya, pineapple, honey, sugarcane, Sichuan pepper during pregnancy as the risk for SA demand further studies.

Conclusion

Our study reveals that women with a previous history of abortion, heavy lifting, emotional disturbances, having health problems during pregnancy, and coffee intake are the significant predictors of spontaneous abortion; whereas, planned pregnancy and preconception counseling are protective factors.

Conflict of Interest
The authors declare that they have no competing interests.

Author Contribution

Concept, design, planning: KMP, KS. Literature review, tool development: KMP, KS, AP, BP. Data collection and analysis: KMP, AP, BP. Writing manuscript: KMP, BP. All authors approved the final manuscript.

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Supplements

INTERVIEW QUESTIONNARES

PART I
SOCIO-DEMOGRAPHIC INFORMATION
S. No:
Date of interview:

1. How old are you?   …………. ………… (Completed years)
2. Ethnic group:
   a. Brahman
   b. Chhetri
   c. Newar
   d. Mangolian (Gurung, Magar, Rai, limbu, Tamang)
   e. Others (Specify)……………………………..

3. Religion:
   a.   Hindu
   a.   b.Buddhist
   b.   Muslim
   c.   Christian
   d.   Other (specify)…….
4. Educational status:
   a.   Illiterate
   b.   Literate
5. If literate:
   a.   Primary
   b.   Secondary
   c.   Higher secondary
   d.   Graduate
   e.   Postgraduate and above
6. Occupation:
   a.   Agriculture
   b.   Housewife
   c.   Service
   d.   Other (specify)……………
7. Family income per month:
   a.   < Rs. 20000/ month
   b.   Rs. 21000- 400000/ month
   c.   Rs. 41000- 60000/month
   d.   Rs. 61000 and above/ month
8. Family type:
   a.   Nuclear
   b.   Joint
   c.   Extended

PART II
Medical and Reproductive history:

9. High blood pressure during this pregnancy: a. Yes   b. No
10. Impaired thyroid function: a. Yes   b. No
11. Gravidity (number of pregnancies) ………..
12. Previous history of abortion: a. Yes   b. No
13. If yes, type of abortion:
   a.   Induced
   b.   Spontaneous abortion
14. Total number of abortions including current abortion:
   a.   One
   b.   Two
   c.   Three and more
15. History of previous stillbirth: a. Yes   b. No
16. History of previous premature delivery: a. Yes   b. No
17. History of previous low birth weight baby delivery: a. Yes   b. No
18. Present pregnancy duration: ……………weeks
19. Was it your planned pregnancy?   a. Yes   b. No
20. Did you attend pre conception counseling?   a. Yes   b. No
21. Did you take folic acid before conception?   a. Yes   b. No
22. Did you conceive through fertility treatments?   a. Yes   b. No
23. If yes, what treatment method did you receive?
   a.   Fertility medicine,
   b.   IVF / Test tube baby (In Vitro Fertilization)
   c.   IUI (Intra Uterine Insemination)
24. Did you have antenatal checkup during pregnancy?   a. Yes   b. No

25. Did you carry/ lift heavy loads during current pregnancy?   a. Yes   b. No
26. Did you do work that required long standing more than six hours per day during pregnancy? a. Yes   b. No
27. Did you perform strenuous or heavy exercise during pregnancy?   a. Yes   b. No
28. Did you have trauma/ injury on your abdomen?   a. Yes   b. No
29. Did you have any emotional disturbances during pregnancy?   a. Yes   b. No
30. What type of stressful situation did you face during this pregnancy?
    a.   Stressful job
    b.   Serious illness (self)
    c.   Serious illness/death of someone close
    d.   Financial problem
    e.   Other stressful or traumatic events (specify)………
31. Did you travel long distance before this incidence?   a. Yes   b. No
32. Did you have any other health problem during current pregnancy?   a. Yes   b. No
33. If yes, specify: …
34. Did you take any drugs during current pregnancy?   a. Yes   b. No
35. If yes, what medicine did you take? Specify: ....
36. Food consuming, drinking and smoking habit: Scale: Frequently Occasionally Rarely Never
    a.   Did you eat papaya during current pregnancy?   ……..
    b.   Did you eat pineapple during pregnancy? ……..
    c.   Did you take honey during pregnancy? ……..
    d.   Did you take red pepper (timmur) during pregnancy? ……..
    e.   Did you take raw sugarcane or Sakkhar" during Pregnancy? ……..
    f.   Did you drink coffee before and during current pregnancy? ……..
    g.   Did you consume alcohol before and during current pregnancy? ……..
    h.   Did you smoke cigarette before and during current pregnancy? ……..