Original Article

Obstetric Outcomes of Amphetamine Misapplication during Pregnancy

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Objective: To assessed pattern of amphetamine use among pregnant women, and its effects on neonates' outcomes.

Materials and Methods: A retrospective study was conducted at Siriraj Hospital, Faculty of Medicine, Mahidol University, Bangkok, Thailand, using hospital medical records of women whose urine tested positive for amphetamine by laboratory test and were admitted for delivery between January 2014 and August 2015. There were 77 women included in the analysis.

Results: Of these 77 pregnant women, 5.2% of them had continued illicit drug used until their labor, 59.7% of them used the drug every day, 59.7% of them had gestational age of 37 weeks or less. Antenatal care was low, at 20.8% and 16% of them had caesarean sections. Complications during labor were eclampsia and gestational hypertension.

Conclusion: Pattern of amphetamine use, especially use frequency and low gestational age has a significant effect on low birth-weight infant. A special antenatal clinic should be set up to provide counseling about their health as well as fetal outcomes.

Keywords: Amphetamine, Pattern of use, Preterm labor, Low birth-weight neonates, Impact

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There is a rising number of substance used especially amphetamine among women worldwide. In the United States about 2.8% of pregnant women are current illicit drug users[1]. In addition, pregnant women with amphetamine abuse are more likely to be younger than 24 years of age[2-4]. In Thailand, one report found 1.4% of pregnant women were amphetamine users[4]. Pregnant women who use amphetamine during pregnancy are more likely to adopt other illicit drugs such as heroine or other addictive substances such as cigarette smoking and alcohol drinking.

Illicit drug used during pregnancy has adverse effects in both mother and fetus. Unfavorable social conditions commonly found among these women e.g., prostitution, unwanted child, can lead to lack and poor antenatal care and subsequent adverse pregnancy outcomes[9,10]. Examples of obstetric conditions demonstrated among these women were hypertension, placental abruption, preterm delivery, low birth weight, still birth and neonatal deaths[9], and etc.[3-7,9-11] esthetic complications such as cardiac arrest before or during delivery, hemodynamic instability and convulsion in the immediate postpartum period were also reported with amphetamine use during pregnancy[12]. Amniotic fluid embolism and intracranial hemorrhage resulting in maternal deaths was also reported[13]. Aside from the immediate effects during the course of pregnancy and peripartum, the illicit drugs also impair growth and development of neonates and their later well-being[14-17]. The pattern of use has to some extent affected the behavioral development of the neonates and their later life[18,19].

Along with the global increased incidence of illicit drug use among pregnant women, there had been a rising number of pregnant women who are amphetamine users admitted to the author's institution for delivery. Prevalence and frequency of use among the pregnant women were more likely to decline at the third trimester, however, many still continue on use until at the labor time[19,20]. Only few studies in Thailand reported the use of amphetamine in pregnant women[4,9]. The pattern of amphetamine use such as the amount taken, duration and frequency of drug use, and its effects on the outcome of the newborns such as birth weight and Apgar scores has not been reported, so far. The present study assessed the patterns of amphetamine use among pregnant women that had the effects on neonates' outcomes.

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Materials and Methods

The present retrospective study covered the hospital registration medical records of women delivered at the Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, Mahidol University between January 2014 and August 2015. Inclusion criteria were pregnant women who used amphetamine and the status of amphetamine use had to be confirmed by urine test, not just only from the hospital records. Women who reported amphetamine use but without any laboratory confirmation and women with incomplete data outcomes were excluded. The assessment was divided into four parts: demographic data of pregnant women, history of drug use, their antenatal care, and the outcome of neonates including birth weight and Apgar scores.

Statistical analysis using SPSS program version number 18 for window was performed to assess frequency, percentage and the logistic regression analysis was employed to predict the pattern of use and the outcome of the neonates. Patterns of use were defined as the duration, amount and frequency of the amphetamine drug use. The present research was approved by the Institutional Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand.

Results

During the study period, 324 women reported for amphetamine use which constituted 1.7% of all pregnant women delivered at the hospital. A total of 247 were excluded due to lack of the confirmation of drug abuse by urine test during admission, or had incomplete data. The only 77 completed hospital registration records of the pregnant women with the confirmation of the urine test were included in the analysis.

Demographic characteristics of women

Table 1 showed the demographic characteristics of pregnant women who used amphetamine during pregnancy. Mean age of pregnant women was 24.3.0±5.8. Over half (51.9%) were at aged of 24 years or under. Over two-thirds of them (73.5%) reached secondary or high school, and one-third completed only primary education. Many of these pregnant women, 57.1%, were broken family. Very few women have earned a regular income and most have depended on the male partner or their own parents. Even though 45.5% of them reported of having some kind of jobs, these were unstable employments. This group of women was more likely to have a large family. Nearly fifty percent of them had three or more children, whereas, those who had two or less accounted for 52%. About one in five women, 22.1%, had at least one abortion in their life. Over one-third (42.8%) of the women had already had one living child, one in five had two children and 16% of them had three or more children. Only 19 women attended the antenatal services, however, very few could complete the antenatal care until child delivery.

Table 1. Demographic characteristics of women (n = 77)

Category	Number (%)
Age (years), mean ± SD	24.3 ± 5.8
≤19	16 (20.8)
20-24	24 (31.1)
25-29	21 (27.3)
30-34	11 (14.3)
≥35	5 (6.2)
Education	
Primary or lower	25 (32.5)
Secondary/high school	47 (41.0)
Vocational school	4 (5.2)
Higher	1 (1.3)
Marital status	
Married	11 (14.3)
Consensual union	22 (28.6)
Separate/divorce/widow	44 (57.1)
Occupation	
House wife/no wage	42 (54.5)
Working outside home	35 (45.5)
Number of pregnancy	
1	20 (26.0)
2	20 (26.0)
3	20 (26.0)
4	13 (16.9)
≥5	4 (5.1)
Number of abortion	
0	54 (70.1)
1	17 (22.1)
≥2	6 (7.8)
Number of living children	
0	10 (13.0)
1	33 (42.8)
2	21 (27.3)
≥3	13 (16.9)

Detail of illicit drug and other substance use

All the pregnant women admitted that they used amphetamine, 5.2% of them used through the course of pregnancy (Table 2). A few women also used the other illicit drug such as cocaine. The shortest and longest duration of the illicit drug use were 3 months and 192 months, respectively, with the median duration was 20 months. Half of the pregnant women used one tablet at each use, and over half of them (59.7%) used the amphetamine every day. Furthermore, some women also used the other substances along with the

Table 2. Illicit drug and other substance use among women (n = 77)

Illicit drug/substance use	Number (%)
Stopped use	
Yes	4 (5.2)
No	73 (94.8)
Pattern of amphetamine use	
Duration of use (month), median (min, max)	20 (3, 192)
• ≤6	18 (23.4)
• 7-12	15 (19.5)
• 13-24	15 (19.5)
• 25-36	8 (10.4)
• 37-48	4 (5.2)
• ≥49	17 (22.1)
Frequency of use*	
Heavy use	46 (59.7)
Moderate use	12 (15.6)
Low use	19 (24.7)
Amount of use	
Half a tablet each time	18 (23.4)
One tablet	39 (50.6)
1-2 tablets	16 (20.8)
≥3 tablets	4 (5.2)
Alcohol use	
Yes	13 (16.9)
No	64 (83.1)
Cigarette smoking	
Yes	21 (27.3)
No	56 (72.7)

* Heavy use (every day or 2-3 times a week), Moderate use (once a week, 2-3 times a month), Low use (once a month)

amphetamine. Thirteen women (16.9%) said they used alcohol, and twenty-one women (27.3%) also smoked cigarette. However, they had stopped using these substances once they learnt that they were pregnant.

Obstetric characteristics of women and neonates

One in five pregnant women (20.8%) attended the antenatal care services (Table 3). Gestational age varied from 32 to 42 weeks. Women with gestational age at 37 weeks and less constituted of 59.7%. Twelve women, 15.6%, had caesarean sections. Thirty-seven percent of the pregnant women delivered the newborns birth weight of 2,500 grams or less. The first Apgar scores at the first minutes varied from 2 to 10 and the prevalence was 9, at 71.4%. The second Apgar at five minutes was normal, at 92.2%. Maternal stay ranged from 2 to 10 days.

A few pregnant women had difficulties during their labor, which could be characterized as eclampsia, gestational hypertension, premature rupture of membrane, thick meconium stain in amniotic fluid, maternal depressive disorder, prolapsed cord, and there was one death (Table 4). Serious problems or complications during labor were predominated by

Table 3. Obstetric characteristics of women and newborns (n = 77)

Obstetric characteristics	Number (%)
Having antenatal care (ANC)	
Yes	16 (20.8)
No	61 (79.2)
Gestational age (weeks), mean ± SD	36.9±2.1
≤37	46 (59.7)
38	13 (16.9)
39	10 (13.0)
≥40	8 (10.4)
Mode of delivery	
Spontaneous	65 (84.4)
Caesarean section	12 (15.6)
Sex of newborn	
Male	45 (58.4)
Female	32 (41.6)
Weight of newborn (g), mean ± SD	2,674±409
≤2,500	29 (36.6)
2,501-3,000	37 (48.1)
≥3,001	11 (14.3)
First Apgar score, median (min, max)	9 (2, 10)
2	1 (1.3)
5	1 (1.3)
6	1 (1.3)
7	2 (2.6)
8	13 (16.9)
9	55 (71.4)
10	4 (5.2)
Second Apgar score, median (min, max)	10 (8, 10)
8	1 (1.3)
9	5 (6.5)
10	71 (92.2)
Maternal stay in hospital (days), median (min, max)	5 (2, 10)
2-3	18 (23.4)
4-5	45 (58.4)
6-7	8 (10.4)
8-9	4 (5.2)
≥10	2 (2.6)

Table 4. Problems during delivery (n = 29)

Characteristics of problem	Number (%)
Eclampsia	5 (17.2)
Gestational hypertension/high blood pressure	4 (13.8)
premature rupture of membrane (PROM)	4 (13.8)
Birth before arrival (BBA)	3 (10.3)
Breech presentation	2 (6.9)
Maternal depressive disorder	2 (6.9)
Manual removal of retained placenta	1 (3.5)
Thick meconium stain in amniotic fluid	1 (3.5)
Prolapsed cord	1 (3.5)
Polyhydranois	1 (3.5)
Fetal distress	1 (3.5)
Pre-term labour	1 (3.5)
Iron deficiency anaemia	1 (3.5)
Hemoglobin H with anaemia	1 (3.5)
Death	1 (3.5)

Table 5. Factors affecting neonates' low birth weight

Characteristic	Neonates' body weight (g)		*p*-value	Crude OR (95% CI)
	>2,501 (n = 69)	≤2,500 (n = 31)		
Age of mother (years), mean ± SD	25.2±5.3	24.8±6.8	0.739	0.99 (0.92 to 1.06)
Frequency of amphetamine use, n (%)				
2-12 times/m	44 (73.3)	16 (26.7)		1
Everyday	8 (47.1)	9 (52.9)	0.046*	3.09 (1.02 to 9.40)
Amount of amphetamine use (tablets), n (%)				
≤2	37 (63.8)	21 (36.2)		1
>2	15 (75.0)	5 (25.0)	0.362	0.59 (0.19 to 1.85)
Duration of amphetamine use (months), n (%)				
≤12	21 (36.4)	12 (36.4)		1
13-24	12 (80.0)	3 (20.0)	0.264	0.44 (0.10 to 1.87)
>24	19 (65.5)	10 (34.5)	0.877	0.92 (0.32 to 2.62)
Alcohol use, n (%)				
No	57 (68.7)	26 (31.3)		1
Yes	11 (73.3)	4 (26.7)	0.719	0.80 (0.23 to 2.74)
Cigarette use, n (%)				
No	53 (73.6)	19 (26.4)		1
Yes	15 (57.7)	11 (42.3)	0.135	2.05 (0.80 to 5.23)

OR = odds ratio; CI = confidence interval

* Statistical significance

Table 6. Association of birth weight and characteristics of amphetamine use

Characteristics	Neonates' body weight (g), n (%)		*p*-value
	<2,500 (n = 69)	≥2,500 (n = 31)	
Frequency of amphetamine use			0.046*
Not everyday	44 (73.3)	16 (26.7)	
Everyday	8 (47.1)	9 (26.7)	
Amount of amphetamine use (tablets)			0.362
<2	37 (63.8)	21 (36.2)	
>2	15 (75.0)	5 (25.0)	
Duration of amphetamine use (months)			0.527
<12	21 (63.6)	12 (36.4)	
>12	31 (70.5)	13 (29.5)	

* Statistical significance

eclampsia and gestational hypertension. A neonate with body weight of 1,610 grams died a few hours after delivery, which make the mortality rate of the newborn in this group 1/77 or 1.3%.

The author studied the association of demographic features of maternal age, gestational age as well as frequency, amount and duration of amphetamine used, and other substances with the pregnancy outcomes (Table 5). There was no significant association between the variables tested except that of the frequency of drug use (p=0.046).

The potential effect of amphetamine use during pregnancy was adjusted for potential confounders using bivariate analysis. Table 6 showed that low birth weight neonates among women used the illicit drug every day was about four folds higher than those women using less frequently (p=0.046).

Discussion

The present study found 1.7% of pregnant women were amphetamine users which was in the range of 1.4 to 1.8 from previous studies[4,9]. The author's prevalence may be lower than the actual use rate due to some reasons. First, some of them could not state the name of the illicit drug or could not recall which among several drugs such as amphetamine, cocaine, marihuana and cannabis, was the most common. Second, the present study included those who were confirmed positive urine amphetamine test.

Antenatal care service is very uncommon among pregnant women with substance use across the globe[3,9,10]. Only very few women (20.8%) in the present report had had a few antenatal care services. Pregnant women of this kind should be encouraged to attend the antenatal care services even though regular prenatal care may not be fulfilled. They should be educated to look after themselves for the healthy newborns. A special antenatal care services should be provided to help accelerate the services, as well as providing counseling on their illicit drug use.

The present study found more than half (59.7%) of the women had history of heavy drug use or used it every day. These women had the neonates with lower birth weight than those who used the drug less frequently. Furthermore, women whose gestational age

was 37 weeks or less were more than four times to have low birth-weight neonates than those women whose gestational age was more than 37 weeks. This finding was also found in many previous studies of pregnant women with many kinds of substance use[3,4,6,7,19,20]. The author could not demonstrate the association of other substances use and neonatal low birth-weight. Long maternal stay in the present report was mainly caused by family problems such as partners or relatives were not available to take care of them or waiting for the results of other tests such as HIV. However, this was not associated with low birth-weight.

The present study also found that 59.7% of women had gestational age of 37 weeks or less. It was possible that amphetamine use might have induced premature labor. Future research should, therefore, be focused on the substance component in the amphetamine that may act as an induction of labor. Stopping of illicit drug use at any time such as first trimester, second trimester can impact a health of newborns including their growth and development in the future[19].

In an attempt to evaluate the pattern of amphetamine use, there were some limitations. The author encountered a difficulty to obtain an accurate data from these women. It was difficult for them to recall their drug behavior regarding amount, frequency and duration of use. Furthermore, the author was not certain whether the information they provided were accurate. On the other hand, the figures they reported were somewhat underrated, because they did not want to reveal the real pattern used, as some women were very confused when providing the information. A future prospective approach study may provide more accurate figures and results and reflect much more vivid pattern of amphetamine use among pregnant women.

Conclusion

In conclusion, the present report presents the pattern, frequency, amount and duration, of amphetamine use in pregnant women, giving birth at Siriraj Hospital, Bangkok, Thailand. Apart from amphetamine use, a few pregnant women have also used other substances such as cocaine, marihuana, cannabis, alcohol and cigarette smoking. These pregnant women are more likely to have low gestational age (59.7%). Low birth-weight neonates among women who used the illicit drug every day is about four folds higher than those women using less frequently (p=0.046). Eclampsia and gestational hypertension are major problems among these women. More and close attention from medical and health personnel should be given to this group of women to reduce the illicit drug use during pregnancy, as well as complications during labor. A special antenatal clinic should be set up for them to provide counseling about their own health as well as growth and development and well-being of their child.

What is already known on this topic?

Amphetamine use has been recorded among pregnant women with the rate of use ranging 1.4% to 1.8%. Some women who used this illicit drug also adopted other substances such as marihuana, cocaine, alcohol and cigarette. Some women may know the adverse effects of the amphetamine on their own health and the child, however, dependency to the substance has compelled many women to still using during pregnancy. Women of low socio-economic level as well as having family problems are more likely to turn to this substance.

What this study adds?

This study found 1.7% of pregnant women admitted to the hospital for child delivery. They were young with mean age of 24.3±5.8 years. All pregnant women with reported amphetamine use were asked for urine test. Those with positive result and having complete hospital record were included to the study. Of 77 women, more than half had no income, and nearly half had 2 to 3 children. Some women used the illicit drug in a long duration, ranging 3 to 192 months, and some were heavy drug use. Moreover, some still used it while being pregnant. About 70% of them took the amphetamine 1 to 2 tablets at a time. Only one in five women did have a prenatal care, however, vary few had completed the prenatal care. Sixty percent of them had the low gestational age, 37 weeks or less. The first Apgar score was not impressive, however, the second Apgar score was normal. Eclampsia and hypertension were leading complications during labor. Over one-third of them had low-birthweight baby. There was no congenital malformation of the neonates, however, there was one neonatal dealth (1.3%).

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Potential conflicts of interest

The authors declare no conflict of interest.

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