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Original Article

Frequency of neonatal abstinence syndrome (NAS) and type of the narcotic substance in neonates born from drug addicted mothers

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ABSTRACT

Background: NAS is a combination of signs and symptoms that due to physical and mental dependency, develops in neonates born from drug addicted mothers. The onset of NAS varies in accordance with the type, amount, frequency and duration of substance used. Because of diverse and unclear pattern of substance abuse in Iranian addicted pregnant mothers in comparison with western countries, this multi-center study has been designed to evaluate NAS in neonates born from drug addicted mothers.

Methods: A cross sectional study was carried out on newborns of narcotic addicted mothers during the first six months of 2008. The newborn's status and clinical signs were checked by physical examination and scored by the Finnegan scoring system.

Results: In this study 100 neonates born from narcotic addicted mothers were examined; the most used narcotic was crack (36%). 60% of neonates showed signs of NAS. The most prevalent signs of NAS were increased muscle tonicity (60%/7), irritability (59%/6) and increased moro reflex (51%/8). Neonates born from crack abusers, in comparison with other drugs, were significantly at risk of NAS (100% vs.87%, P<0.03).

Conclusion: Public education as regards to the negative impact of substance abuse in pregnancy is strongly advised so as to promote health status of the society. It is substantial to encourage women at reproductive age to quit addiction before pregnancy, or even undergoing drug replacement therapy with low risk narcotics in order to completely prevent NAS.

Keywords: Addiction, NAS, Pregnancy

Introduction

In this day and age, substance abuse has crossed most of the social, economic and geographical boundaries, and it has been known as one of the worldwide health problems, which not only does threaten dissimilar population groups including pregnant women, but also it is considered as one of the high risk health behaviors resulting in complications and adverse consequences in mother and fetus. Also, outcomes of mother's addiction on her newborn should be taken into serious consideration, since these neonates have lower weight, they have smaller head circumference and of course are shorter than normal, moreover their growth will be impaired in the following stages of life (1). Pregnancy in a drug addicted mother is defined as high risk pregnancy and such a neonate is known as high risk neonate (2).

NAS is a combination of signs and symptoms presented in neonates born from mothers using opioids, cocaine, cannabis/hashish, etc which cause physical and mental dependency. Clinical manifestations of NAS vary depending on the type, amount, frequency and duration of substance use, as well as mother and placenta's metabolism and transmission of the drug via placenta (3). Suitable treatment is necessary no more than 5-20% of neonates with severe signs of NAS, and a remarkable number of other cases of NAS should only undergo supportive measures (1). Since most of the opioids receptors are in central nervous and gastrointestinal systems, signs of the disease are clearer in these two systems shown in the form of increased autonomic activity, increased irritability and gastrointestinal dysfunction.

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Some of the signs of this syndrome are as follows: crying with high tonicity, abnormal sleep pattern, increased moro reflex, tremor, irritability, increased muscle tonicity, skin scratches, myoclonic jerks, convulsion, sweating and fever, abnormal body temperature (hyper or hypothermia), yawning, mottling, nasal congestion, tachypnea, diarrhea, vomiting and regurgitation (4). On the whole, tremor and irritability are known as the most prevalent signs (5). However, diarrhea and vomiting are the two serious problems in NAS which could lead to some complications such as dehydration, electrolyte imbalance, weight loss, pneumonia, aspiration, respiratory alkalosis and convulsion (6). Moreover, PROM, IUGR, high rate of mortality and morbidity at delivery are the prevalent findings in such neonates (7). Spectrum and intensity of signs depend on the dose and frequency of use, metabolism, excretion and half-life of the drug (8). Most recently, due to the epidemic use of forbidden drugs in pregnancy, societies all over the world have faced a serious health problem which threatens their wellbeing (9-11). Methadone, morphine, heroin and marijuana are the most prevalent substances used by pregnant women in developed countries (12), while in Najari's study in 2007 in Iran; the most dominant narcotic substance was opium (13).

In view of the fact that the pattern of drug abuse in western countries differs from Iran, the worldwide available information and solutions presented in different studies are not compatible with the condition of our society. Thus this study is designed to evaluate the prevalence and signs of NAS according to the type of the narcotic substance used by mother consistent with unclear and probably different pattern of substance abuse in Iranian pregnant mothers, the weak relationship between the signs and the applied narcotics and absence of a comprehensive study on the signs and symptoms of NAS in Iran.

Material and Method

This cross-sectional study was carried out on drug addicted mothers referring to labor emergencies of Imam-Khomeini hospital (a tertiary multi-specialty hospital with roughly 1500 deliveries a year) also Akbar Abadi hospital (specialized in gynecology and obstetrics with approximately 3000 deliveries a year) during 2010-2011. Addicted mother was defined as one time exposure or more to any type of narcotic substance in pregnancy. A questionnaire was filled out which included mother's age, type of delivery, type of abused drug in pregnancy, amount of use (daily, weekly, monthly), the last date of exposure, cigarette smoking, mother's disease, neonate's clinical signs, Apgar score, findings of physical examination of neonates according to the Finnegan Scoring System and duration of the neonatal abstinence syndrome.

Use of any narcotic substance either once or more in pregnancy was considered as exposure. NAS was the expected outcome (including gastrointestinal, respiratory and nervous signs) according to the table of variables in neonates admitted to the neonatal ward and NICU and the Finnegan scoring system. The aforementioned signs were checked at the onset of delivery, followed by every four hours within the first seven days of birth until the complete remission of signs. In case of incidence of any sign until discharge, its clinical form and scores were recorded on a separate sheet.

The gastrointestinal, respiratory and CNS clinical signs and their intensity were checked by the Finnegan scoring system. If the result showed three consecutive scores of eight or more and two non-consecutive scores of 12, it would mean that treatment was necessary.

Data were analyzed by SPSS V15 under the supervision of a statistics consultant .Descriptive and analytical statistics were extracted and analyzed by T test=X2. Power of the study and level of significance were considered 90% and 95% respectively. Given the ethical considerations, all of the recorded data of patients were kept confidential. Each and every one of the participants of the study was clearly informed about the objectives of the study and how to take part in it. Necessary care and treatment were properly provided also no extra charges were imposed on the participants. All of the confounding factors which could distort the therapeutic patterns were excluded from the study. This study was scientifically and ethically approved by the ethics committee of research council of Tehran University of Medical Sciences.

Results

Over one-year period (2010-11), 100 (1.5%) pregnant women who were narcotic abusers referred to Imam-Khomeini and Akbar Abadi hospitals (for delivery), affiliated to Tehran University of Medical Sciences. 56% of deliveries were vaginal delivery and 43% were cesarean section. Comprehensive pregnancy care was followed only in 3% of pregnant mothers, 68% underwent no care, and 29% of them received pregnancy care on an average level.

The mean age of mothers was 27.98± 6.08, and majority of them i.e., 77 (77%) who were drug abusers had labor in Akbar Abadi hospital.

The mean gestational age was 37.29±1.61 weeks, average weight of neonates was 2731±571gr, average height was 48.38±1.96cm, and the average head circumference was 33.82±571 cm. low birth weight and Intrauterine growth retardation (IUGR) were reported in 3 (3%) neonates of addicted mothers, and 19 mothers (19%) used to smoke cigarette along with substance abuse. 3.4% had the history of alcohol consumption in pregnancy. Congenital abnormality was not seen in any neonate.

36% of addicted mothers were crack abuser, 40% were taking other narcotics (opium and heroin), and others had the history of sedative use. 21 mothers (21%) used narcotics once a day. Six (6%) addicted mothers took the last dose of the drug one hour before delivery, 2% used until the last two hours before delivery, 6% used the day before delivery and others used narcotic substance at different intervals and farther than one day before delivery. No significant relationship was found between the average of the last dose/time of substance use, the first and fifth minute Apgar score and cigarette smoking in the two groups of neonates with and without NAS.

In terms of incidence of NAS in relation with the type of narcotic substance, crack was found as the most abused drug. Overall, 60% of neonates showed signs of NAS and 60% of neonates with NAS were born from crack abusers. In other words, 100% of neonates born from crack abusers were affected by NAS, while signs of this syndrome were seen in 87% of neonates born from mothers using other narcotics.56 of neonates were boys (56%) and 44(44%) were girls. The most prevalent signs of NAS were increased moro reflex in 71 (71%) neonates, increased muscle tonicity in 60(60%) neonates, but irritability and skin mottling were rather less prevalent (13 neonates, 13%).

Given the frequency of the narcotic substance, neonatal outcomes were compared between the two groups of crack and other narcotic abusers. No significant difference was seen in the two mentioned groups in terms of receiving pregnancy care and services. NICU admission in neonates born from crack abusers was more significant than others (30.5% (11 neonates) vs. 10% (5 neonates) (P<0.031). Sweating was also seen more in such neonates (58% (16 neonates) vs.11% (21 neonates) (P<0.002).

There was no significant difference in type of nutrition in the two groups of neonates. Two deaths were seen in each group. Signs of NAS were more significantly seen in neonates born from mothers using crack (P<0.030). It should be emphasized that no significant difference was seen in the two groups in terms of duration of use and the last time of use before delivery. Also, cigarette smoking and Apgar score at birth were not different in the two groups of neonates.

Discussion

In this study data were collected from mothers referring to Imam-Khomeini and Akbar Abadi hospitals in order to evaluate substance abuse in pregnancy and its adverse impact on neonates. According to the analysis, change of the used substance was very obvious in comparison with other studies. Thus, crack was the most used drug, and 60% of neonates affected by NAS were born from mothers using crack. In Andreea's study the most prevalent reason for NAS in neonates was mother's addiction to opioids (14). In Blaser A 's retrospective study (2008) which was carried out from 1997 to 2003 in Germany, 49 neonates born from drug addicted mothers referred to clinics, 33 of which were from mothers using methadone, some were on heroin and benzodiazepines, and a few used cocaine and cannabis/hashish. NAS was reported in 71% of neonates born from the aforementioned mothers (15).

In Crosetti Mt's study in Maryland (2007), the most used substance was heroin, and also majority of neonates born from heroin abusers had NAS (16). Percentage of incidence in our study was slightly lower than the aforementioned study. However, it is in general indicative of high percentage of incidence of complications and adverse impacts in neonates.

NAS was more seen in boys than girls, which Jansson's study showed that boys had a higher score and needed longer period of treatment (17).

In the present study 19% of drug addicted mothers used to smoke cigarette, and 3.4% of them used alcohol in pregnancy too. According to King's study and Health Department of America, 90% of women were drug abusers and cigarette smokers (18, 19), which is quite more than our findings. This, to some extent, could be related to our culture in which cigarette smoking is very unusual and inappropriate for women, especially pregnant ones. Also, use of narcotics and cigarette, alcohol, poverty and mother's diseases could be acknowledged as effective factors on growth of fetus. Fetal growth retardation in cigarette

smoking mothers is the consequence of failure of placenta.

Given the relationship between pre-term neonates and NAS, Doberczak and Dysart's studies showed less incidence of NAS in pre-term neonates (6, 7). In Dryden's study no relationship was seen between gestational age and NAS (20). Nonspecific signs of NAS in pre-mature neonates might justify this issue. In the present study no relationship was seen between gestational age, preterm labor and NAS. The current pattern of narcotic abuse in each country might be a reason for such findings.

As said by a study designed by Mark et al. in 2012, involvement of central nervous system, gastrointestinal and respiratory systems are signs of this syndrome. Tremor and irritability are known as the most prevalent signs too (1).

In Philip's study, tremor, irritability, increased crying, increased muscle tonicity, tachypnea, increased respiratory rate (more than 5) are the most important and prevalent signs (8). In Tenebein 's study (1996) intense crying, insomnia, hypertonicity (of muscles), tremor, hypotonia and poor sucking were reported as prevalent signs of this syndrome according to the Finnegan Scoring System (9).

In Tiroumourougane's study (2008) on 32 neonates born from drug addicted mothers, irritability, intense crying, increased muscle tonicity, tachypnea, insomnia and tremor were the most prevalent signs of NAS according to the Finnegan Scoring System (10). O 'Brien et al.'s study in 2002 showed that change of sleep pattern and sleep disorder developed in NAS is due to the narcotic withdrawal (21).

In the present study increased muscle tonicity i.e. involvement of central nervous system and autonomic system are seen as the most prevalent signs according to the Finnegan Scoring System.

In Fyemirokun-odudeyi 's study (2006) on drug abusing women , increased prematurity and neonatal death were reported , and neonates born from mothers using heroin at the end of their pregnancy showed more intense signs of NAS. Also such neonates had more prolonged hospital stay than the ones born from methadone abusers (22). In this study, crack abusers were at more risk of incidence than non-crack abusers, but rate of prematurity and death was not different (between them).

Given the 60% incidence of NAS in neonates born from drug addicted mothers, public education on adverse effects of substance abuse in pregnancy is seriously advised in order to promote health status of the society. Above and beyond it is imperative to encourage women at reproductive age to quit their addiction before pregnancy, otherwise persuading them to undergo drug replacement therapy to lower the risk of complications during pregnancy.

Seeing as the type of the narcotic substance used by pregnant women is one of the most important factors in incidence, intensity and diversity of neonatal signs, looking for a more practical and applicable diagnostic and therapeutic protocols is strongly recommended. I should be added that the majority of the present protocols are related to the narcotic substances which are more prevalent in western and European countries.

In conclusion, further studies with larger sample size should be carried out separately on neonates and mothers who use crack and opium.

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