A Comparison between APGAR Scores and Birth Weight in Infants of Addicted and Non-Addicted Mothers

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Abstract

Background: Addiction in pregnant women causes complications such as abortion, asphyxia and cerebral and physical problems. APGAR score assesses vital signs and birth weight and represents the physical and brain growth of newborns. In this study, the effects of opium addiction in mothers on birth weight and APGAR scores of neonates were discussed.

Methods: This study analytic, descriptive study was conducted on 49 pregnant women addicted to oral consumption of opium (0.5-0.8 grams daily) and 49 non-addicted women who referred to Afzalipour Hospital associated with Kerman University of Medical Sciences. Information including various personal characteristics, history of addiction and drug consumption, and the possibility of taking other drugs was collected by a researcher and recorded confidentially in a checklist. Birth weight and APGAR score t first, fifth and tenth minutes were also recorded. Statistical analysis was performed using Pearson correlation test, independent t-test, and repeated measure to evaluate the APGAR scores and other characteristics of the two groups of infants.

Findings: Average birth weight of infants with addicted mothers was 2255 grams which had a significant difference with infants born by non-addicted mothers ($P < 0.0001$). Average APGAR scores at the first minute were 7.6 ± 1.1 and 8.6 ± 1.1 among infants from addicted and non-addicted mothers, respectively. Average APGAR scores over time (at minutes 1, 5 and 10) had a significant difference ($P < 0.0001$) where an ascending trend was seen. This difference was significant in both groups ($P = 0.003$).

Conclusion: Drug addiction in mothers decreases the APGAR score and birth weight of infants.

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Introduction

According to a report from Iran Drug Control Headquarters, there are no exact statistics of the population of addicts in the country. Based on conducted researches, women make up 6.9 percent of drug addicts. While the statistical report provided by the Ministry of Health showed a female/male ratio of one to eight among addicts, some other reports have found the ratio to be 7/100.[1] According to a survey by the National Organization for Drug Abuse and Mental Health of United States of America, the rate of drug abuse among pregnant women aging 15 to 17 years old was more than non-pregnant women (21.6 vs. 12.9) in 2008-2009. In contrast, the number of addicted pregnant women between 18 to 25 was lower than non-pregnant women (7.1 versus 16.2).[2] Reduced health assessment scores (APGAR scores) and low weight are common among babies born from addicted mothers. Complications of pregnancy and delivery may also occur due to transmission of addiction from mother to fetus.[3] Narcotics withdrawal symptoms may be observed in different forms during the first minutes after birth.[3,4] Breathing in neonates will be as apnea (not breathing) and asphyxia (arterial oxygen pressure and increase in carbonic anhydride and acidosis). Subsequently, the infant may suffer various forms of drug withdrawal symptoms such as intermittent crying (high-pitched), lack of sucking reflex, high fever, nausea, diarrhea and convulsions. Drug withdrawal symptoms begin within 48 to 72 hours after birth.[5,6]

The APGAR score was introduced for the first time by Ms. APGAR in 1953. Its normal maximum score is 10.[7] APGAR score assesses five vital organs through evaluation of heart rate, breathing, color, muscle tone, and reflex response. APGAR score at the fifth minute and after that represents the infant's neurological future.[8] Even with careful monitoring of vital signs of the addicted mothers' infants at equipped medical centers, their neonatal morbidity and mortality have been reported 2.5 times more than normal infants.[9] Rates of complications of pregnancy and delivery including miscarriage, premature infant, and asphyxia have been reported to be higher in these infants than healthy newborns.[3,10] Various studies have shown most babies born from addicted mothers to be premature (preterm) and below the standard weight of 2.5 Kg (35%). Low

weight indicates dehydration in infants and it should be noted at the time of re-hydration with intravenous fluids.[11] Due to the effects of the drug crossing the placenta, many economic and cultural factors, and inadequate nutrition during pregnancy, the fetus often suffers from intrauterine growth retardation compared to its gestational age.[12] In addition, 55 to 90 percent of these infants have severe drug dependence and manifest drug withdrawal symptoms after delivery.[13] Unfortunately, due to various reasons such as cultural, social, and genetic factors, 70% of these infants will join perpetual drug users in the future.[12] Addiction to cocaine in America and Europe is more than any other drugs with 10 to 15 percent of mothers being addicted to cocaine. The prevalence ratio of neurological disorders in infants with reduction in APGAR score is about 4.02.[8] Conducted surveys showed that the hospitalization costs of these infants are about 10 times more than healthy babies and that they needed extreme care up to 6 months.[14] Addicted women often use different recreational drugs, tranquilizers and other materials such as tobacco, cigarettes and alcohol resulting in additional complications which can cause various deformities in infants. Treatment of these cases is much more difficult than the those using drugs alone.[15] Multiple visits of addicted mothers during pregnancy (prenatal) and using necessary and timely treatments significantly prevent the complications in mothers and their infants.[16] The present study has been performed in order to investigate the effects of drugs on weight and APGAR scores of infants with addicted mothers.

Methods

In this analytic, descriptive study, during 8 consecutive months, 49 female drug addicts and 49 non-addicted women were included (no selection method was concerned since the addicts were not willing to participate and only those who agreed were studied) and referred to the Department of Obstetrics Gynecology of Afzalipour Hospital affiliated to Kerman University of Medical Sciences to perform caesarean delivery. All addicted subjects consumed 0.5 to 0.8 grams of opium syrup orally in the morning and at night. Those who used other drugs or other methods were excluded from the study. Before entering the operating room, the researcher asked the patients some

questions. The checklist included a variety of personal characteristics, family history of addiction, severity of consumption, the amount of consumption, instructions of using, the possibility of associated drugs consumption and other necessary information. The obtained data was written confidentially in the checklist. Then, mother and baby's vital signs and results of routine laboratory tests were recorded (in a checklist) by an executive (MSc in Anesthesiology). Patients with underlying diseases such as asthma, diabetes, hypertension and preeclampsia were excluded from the study. Most subjects underwent cesarean in non-emergency conditions and with previous preparations. Individuals in both groups were under general anesthesia using a uniform procedure. After placing the patient on the operating table, a suitable vein was found and the pulse oximetry and various monitoring systems were connected. Subsequently, preoxygenation was conducted using oxygen masks for less than 6 minutes. Induction of anesthesia began with 0.5 mg/kg ketamine, 4 mg/kg sodium thiopental, and 1.5 mg/kg succinylcholine. After endotracheal isoflurane, the continuation and maintaining of anesthesia was performed with 40% oxygen, 60% N_2O, 0.6% isoflurane and 30 mg atracurium (muscle relaxant). After child-birth, 2-3 cc fentanyl and 30 mg pethidine (since patients were kept nil per oral) were injected into mothers' veins. If needed, the injections were repeated during the surgery and recovery especially in addicted patients.

Immediately after birth, the infants were placed in the special place, dried by the pediatric and anesthesiologist experts and the APGAR score was recorded in the checklists. The cardiac and pulmonary resuscitations were performed in required cases. At the fifth and tenth minutes after birth, weight and APGAR scores of the infants were recorded in the operating room and entered in the checklist of each subject. When the infants' vital signs were stable, they were tagged with a special label and transferred to the infant room. Maternal and neonatal vital signs and general terms were under the control of the anesthesiologist, gynecologist and pediatrician up to 48 hours. Their general condition was registered in special checklists. During this period of time, they were transferred to the ICU

if the mother or the newborn had uncontrolled general conditions. Special supporting was performed in the ICU. The patients' checklists were collected after completion in the operating room and ICU. According to the measurement of APGAR score at the 1st, 5th and 10th minutes after birth, the repeated measure test was used. These tests were used for determining the trend of changes through time and reviewing the differences in APGAR scores in the two groups of addicts and non-addicts. The Pearson correlation coefficient and t-test were used in order to investigate the correlated variables of maternal age, birth weight, and APGAR score. Two independent samples t-test was applied to compare the average weight of newborns of the addicted and non-addicted mothers. Data analysis was performed using SPSS software.

Results

This study comprised 98 infants of addicted and non-addicted mothers (each group consisted of 49 infants). The average age of mothers was 33 ± 5.5 years and the mean weight of newborns was 2582 ± 589.7 grams. The first-minute, fifth-minute and tenth-minute APGAR score averaged 8.1 ± 1.2, 8.8 ± 0.9, and 9.5 ± 0.8, respectively. In the investigated sample, 83 infants were delivered in non-emergency situations, among which 39 were non-addicted and 44 were addicted (Table 1).

The number of infants weighing less than 2500 grams born by addicted mothers was about 5 times more than non-addicted mothers (Table 2).

According to table 3, the average infant weight of non-addicted mothers was significantly more than addicted ones (P < 0.0001). The confidence interval of mean differences was from 456.9 to 851.6 grams. Mean APGAR score at all times (minutes 1, 5 and 10 after birth) in infants of non-addicted mothers was more than in those of addicted mothers. While the minimum APGAR scores of infants of addicted mothers at 1st, fifth, and tenth minutes were 5, 6, and 6, respectively, the corresponding numbers were 7, 7, and 7 among infants of non-addicted mothers. Since the difference between the APGAR scores of the two groups was one unit at first minute, 0.8 at the fifth minute, and 0.6 at the tenth minute, it can be concluded that the difference will be decreased over time.

Table 1. Frequency distribution and percentage of emergency condition deliveries among addicted and non-addicted mothers

Variable	Emergency condition delivery		Non-emergency condition delivery	
	Frequency	Percentage	Frequency	Percentage
Addicted mothers	10	20.4	39	79.6
Non-addicted mothers	5	10.2	44	89.8
Total	15	15.3	83	84.7

Table 2. Frequency distribution and percentage of newborns' weight

Variable	Infant weight			
	Less than 2500 grams		2500 grams or more	
	Frequency	Percentage	Frequency	Percentage
Addicted mothers	37	75.5	12	24.5
Non-addicted mothers	7	14.3	42	85.7
Total	44	44.9	54	55.1

Table 3. The mean and standard deviation (SD) of maternal age, birth weight and APGAR score

Variable	Addicted mothers (n = 49)		Non-addicted mothers (n = 49)	
	Mean	SD	Mean	SD
Maternal age (years)	34.4	5.0	31.6	5.6
Birth weight (grams)	2255	534.8	2909	445.3
APGAR score at 1st minute	7.6	1.1	8.6	1.1
APGAR score at 5th minute	8.4	0.9	9.2	0.7
APGAR score at 10th minute	9.3	1.0	9.9	0.4
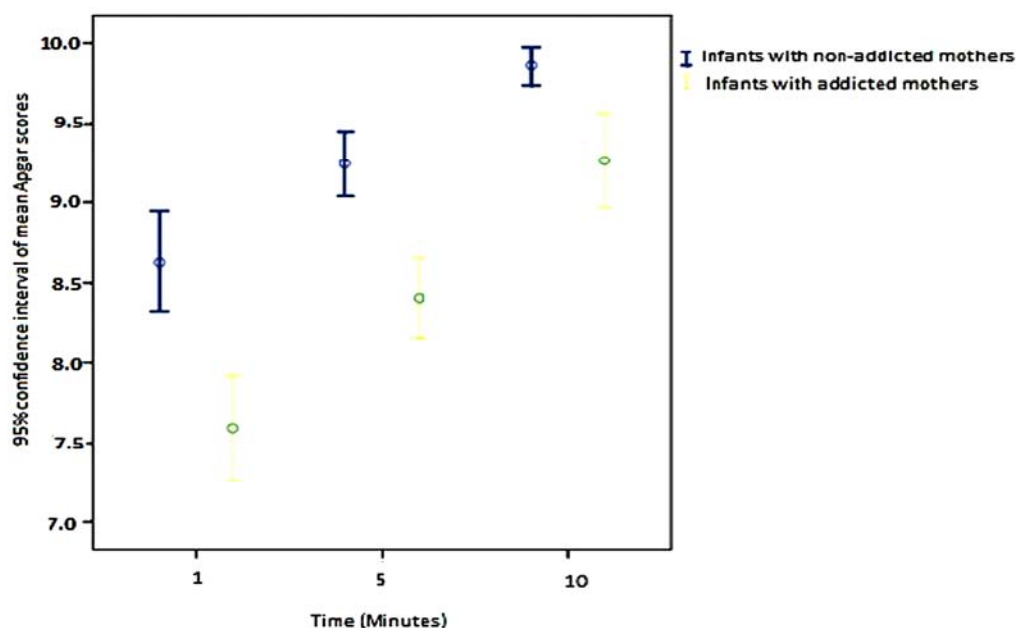
Figure 1. The 95% confidence interval for neonatal mean APGAR scores at the 1st, 5th and 10th minutes after child-birth

Discussion

According to the study of correlation coefficient, a direct and significant relationship was observed between birth weight and APGAR scores at the 1st, 5th and 10th minutes (P < 0.0001). In other words, an increase in birth weight would lead to increased APGAR scores and vice versa. According to performed repeated measure test, mean APGAR score had a changed significantly over time (minutes of 1, 5 and 10) (P < 0.0001). Figure 1 shows this difference and its upward trend. Difference of mean APGAR scores between the two groups was significant at all times (P < 0.0001). This

was the case in both groups). In addition, the mean APGAR score in infants of both groups had a significant difference (P < 0.0001).

Addiction not only has devastating effects on mothers, but also imposes greater adverse effects on their infants which can cause a vicious cycle during their lives. Neonatal morbidity and mortality, especially in the first 6 months of life, are high due to various reasons.[6-17] In this study, 20.4% of emergency deliveries were related to addicted mothers and 75.5% of infants with addicted mothers weighed less than 2,500 grams which was approximately five times more than those with non-addicted mothers. Low birth weight increases the duration of pregnancy and infant mental development is also delayed.[18] Another study showed that drugs cause significant weight loss in newborns.[12] In a study conducted in Hong Kong, low birth weight was found to be higher among infants of smoking mothers.[19] Like the present study, Lewis et al. indicated complications of preterm birth, birth weight less than 2500 grams, meconium, and placental detachment to be common, especially among infants with cocaine-addicted mothers.[20] Addicted mothers' infants face intra-uterine growth retardation (IUGR) with respect to gestational age often due to malnutrition, along with consumption of other substances like alcohol, tobacco, cigarettes, etc. These infants have APGAR scores below that of infants born by normal non-addicted mothers.[8-18] These newborns may suffer from a number of birth complications including apnea (not breathing), heart abnormalities, seizures and asphyxia (reduced oxygen pressure, increasing pressure of carbonic anhydride and acidosis), cyanosis (due to withdrawal of the drug), IUGR, and mental problems. These complications will cause irreversible brain damage if not treated on time.[6-21]

APGAR score in infants of addicted mothers may fall sharply and could fall below 7.[22] In a study performed on mothers addicted to opiates or amphetamines, it was observed that the probability of an APGAR score below 7 is high in the infants of mothers addicted to amphetamines.[23] APGAR scores of non-addicted mothers' infants were more than addicted mothers. While all infants born from non-addicted mothers had normal first minute APGAR scores, 14.3% of infants born from addicted mothers had abnormal first minute APGAR scores (less than 7) and needed cardiopulmonary cerebral resuscitation (CPCR). Early detection of lower APGAR scores and on time treatment can prevent irreversible complications in infants. Studies showed that vital signs of infants born from addicted mothers have frequently been low[24] which may be due to the effects of drugs on the fetus. These effects will increase the hospitalization duration. Drugs can cause increased morbidity and mortality in infants.[25] Garn et al. studied 43,492 smoker mothers and suggested the number of cigarette packs consumed per day to be associated with low APGAR scores in both groups of white and black participants.[26] Fisher et al. carried out a research on mothers addicted to opiates and found that mothers who used buprenorphine during their pregnancy gave birth to infants with normal weight and APGAR scores.[27]

Addiction in mothers will increase the economic costs, including medical costs, of families and the society. On the other hand, addiction in mothers may cause irreversible complications in infants.[13] Therefore, we should consider the above mentioned factors in dealing with addicted mothers giving birth in order to minimize the irreparable risks on mothers and infants. Mothers and babies are among high-risk patients and respiratory and neurological disorders occur more in them. Symptoms of drug withdrawal and an increase in genetic and congenital defects are also common which may lead to high rates of morbidity and mortality. HIV and hepatitis B (HBV) test should be conducted on these patients since they are at high risk of these diseases. On the other hand, we should think of solutions to make patients willing to be introduced to withdrawal centers. Recently, buprenorphine tablets are used for treatment of addiction in mothers and also for reducing neonatal complications. Studies have revealed that buprenorphine reduced not only withdrawal symptoms in infants, but also length of mothers' hospitalization.[28] Treatment techniques with methadone syrup and tablets can help a lot for having a painless and symptom-free withdrawal process. However, the duration of treatment of the mother depends on the dosage. Further investigations are needed to study the scientific aspects of addiction treatments.

One of the limitations of this study was the

small number of subjects caused by mothers' refusal to express their drug addiction since their families were not aware of the issue or

they were afraid to talk about it.

Conflict of Interest: The Authors have no conflict of interest.

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بررسی نمره APGAR و وزن هنگام تولد در نوزادان مادران معتاد در مقایسه با نوزادان مادران غیر معتاد

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چکیده

مقدمه: اعتیاد در مادران باردار سبب عوارضی از قبیل سقط، آسفیکسی و مشکلات مغزی و جسمی می‌گردد. معیار APGAR به ارزیابی علایم حیاتی کمک می‌کند. همچنین وزن نوزاد در هنگام تولد نشان دهنده رشد جسمانی و مغزی او می‌باشد. در این مطالعه به بررسی تأثیر اعتیاد به تریاک در مادران بر معیار APGAR و وزن هنگام تولد پرداخته شد.

روش‌ها: این مطالعه از نوع تحلیلی- توصیفی بود. افراد مورد مطالعه شامل ۴۹ نفر خانم باردار معتاد به مواد مخدر که تریاک را به صورت خوراکی و به میزان ۰/۵ تا ۰/۸ گرم در روز مصرف می‌کردند و ۴۹ نفر خانم غیر معتاد به مواد مخدر که جهت انجام زایمان به بیمارستان افضلی‌پور دانشگاه علوم پزشکی کرمان مراجعه کرده بودند، می‌شدند. اطلاعات شامل خصوصیات مختلف فردی، سابقه اعتیاد و میزان مصرف مواد مخدر، نحوه مصرف و احتمال مصرف داروی‌های همراه بود که توسط محقق از بیمار پرسیده و در چک لیستی به صورت محرمانه یادداشت می‌شد. همچنین وزن نوزاد هنگام تولد و نمره APGAR دقایق ۱، ۵ و ۱۰ نوزادن این مادران در بدو تولد جمع‌آوری گردید. از آزمون‌های آماری ضریب همبستگی Pearson، t دو نمونه مستقل و آزمون Repeated measure به منظور بررسی روند نمره APGAR در دقایق مختلف و بررسی روند در دو گروه نوزاد استفاده گردید.

یافته‌ها: میانگین وزن نوزادن مادران معتاد در هنگام تولد ۲۲۵۵ گرم بود که در مقایسه با نوزادان مادران غیر معتاد اختلاف معنی‌داری داشت ($P < ۰/۰۰۰۱$). میانگین نمره APGAR در دقیقه اول نوزادان مادران معتاد ۷/۶ ± ۱/۱ و در نوزادان مادران غیر معتاد ۸/۶ ± ۱/۱ بود. میانگین نمره APGAR در طول زمان (دقایق ۱، ۵ و ۱۰) اختلاف معنی‌داری داشت ($P < ۰/۰۰۰۱$). همچنین روند آن صعودی بود و این اختلاف در دو گروه نوزاد نیز معنی‌دار بود ($P = ۰/۰۰۳$).

نتیجه‌گیری: اعتیاد به مواد مخدر در مادران باعث افت APGAR اسکور و کاهش وزن هنگام تولد می‌شود. نتایج این پژوهش اهمیت توجه به نوزادان مادران معتاد را نشان می‌دهد. بنابراین باید در هنگام تولد این نوزادان به علایم حیاتی و وزن توجه داشت.

واژگان کلیدی: نمره APGAR، وزن نوزاد هنگام تولد، مادران معتاد، مواد مخدر.

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