Journal of Neonatal Nursing (2016) 22, 56—60

www.elsevier.com/jneo

ORIGINAL ARTICLE

Maternal cocaine abuse — An evidence review

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Available online 12 October 2015

KEYWORDS
Neonatal;
Cocaine;
NICU;
Maternal;
Substance;
Abuse;
Registered nurse

Abstract In Australia, the use of illicit substances is on the rise, with as many as two in five people admitting to having ever used an illicit substance. As illicit drug availability is becoming ever more readily available, it has been argued that maternal substance use is increasing the demands of neonatal intensive care units and special care nurseries Australia wide. Cocaine causes miscarriage due to its vasoconstrictive effects on the blood supply of the developing foetus when used during the first trimester of pregnancy. Furthermore there is an increased risk of the foetus developing congenital anomalies and insufficient intracranial growth all due to the vasoconstrictive teratogenic effects of cocaine.

Within this paper, common teratogenic effects of prenatal cocaine use are explored and further supplemented with the documented associated short and long term effects of such illicit drug use as reported in recent literature.

The most common short term effect of maternal substance use on the neonate is neonatal abstinence syndrome (NAS) being one of the most common reasons and possibly unavoidable for admission to a neonatal intensive care unit (NICU). Such impacts upon NICUs are explored and discussed.

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http://dx.doi.org/10.1016/j.jnn.2015.09.002
1355-1841/

Introduction

In an age where illicit substances are becoming increasingly easily accessible, it is not surprising that the health system is seeing an increase in babies born with severe deformities, evidence of neonatal abstinence syndrome and ongoing behavioural and cognitive developmental impediments (AIHW, 2014). In Australia according to the National Drug Strategy Household Survey of 2013, the use of illicit substances is on the rise, with as many as two in five people admitting to having used an illicit substance (AIHW, 2014). Globally, illicit substance use has increased by 52% between 1990 and 2010 (Degenhardt et al., 2013). As illicit drug availability is becoming ever more readily available, it is arguable that maternal substance use is increasing the demands of neonatal intensive care units and special care nurseries Australia wide. To sustain this argument, this evidence review aims to uncover the dimensions of maternal substance use by reviewing current literature within the field, with a particular focus on maternal cocaine usage. Furthermore, the review will then provide an analytical summary of commonly associated health issues related to maternal cocaine use, beginning with intrauterine development, embryology and accompanying pathophysiological pathways. Associated childhood and early adulthood implications will be explored, along with the neonatal nursing management requirements necessary to support families affected by the outcomes of maternal cocaine abuse.

Methodology

Utilising medical subject heading (MeSH) terms for the purpose of obtaining relevant and recent literature, CINAHL, pubMED and Medline were the databases of choice for this research paper. Using MeSH terms of 'neonatal', 'substance', 'cocaine', 'abuse', and 'maternal' with a Boolean search type 1178 results were retrieved. From these results the search criteria were further filtered to approximate the results from the last five years and were selected based on their peer-reviewed status. From this, approximately 249 results remained. The articles reviewed in this paper were hand selected based upon their relevance to the topic and, where possible, Australian data was a preferred resource.

Teratogenic effects

Cocaine is available in natural and synthetic forms depending upon the source (Harris et al., 2010). It has direct effects on the central nervous system (CNS) allowing it to diffuse through the blood—brain barrier of both mother and foetus as it can cross the placenta to the foetus (Sherman, 2015). Cocaine has vasoconstrictive effects on the maternal blood vessels including the placenta, often leading to intrauterine foetal growth restriction, hypoxia, preterm delivery and small for gestational age neonates (Sherman, 2015). As the cocaine is available to the foetus, vasoconstriction also occurs within the foetus with the potential to cause foetal vascular disruption, resulting in limb defects and even the absence of limbs (Weiner and Finnegan, 2011). All of the aforementioned outcomes of maternal cocaine use can have both short and long term effects on the foetus, newly born neonate and mother, of which numerous consequences have been well documented in the literature. It is important to recognise that in more than half of cases, maternal illicit substance use is associated with alcohol and/or tobacco use thus presenting more complications to neonatal care, however, in the instance of this paper, prenatal cocaine use will be of focus (Passey et al., 2014).

Teratogenic effects in particular have been well represented within the literature, encompassing many of the commonly reported effects of cocaine on both the neonate and the mother. Cocaine is notorious for causing miscarriage due to its vasoconstrictive effects to the blood supply of the developing foetus when used during the first trimester of pregnancy (Cain et al., 2013). During the first trimester there is also an increased risk of the foetus developing a cardiac defect, bowel and limb defects and insufficient intracranial growth all due to the vasoconstrictive teratogenic effects of cocaine (Cain et al., 2013; Soto and Bahado-Singh, 2013). During the second trimester, the foetus is exposed to greater amounts of cocaine as maternal metabolic functionality is decreased, leading to an increased half-life of cocaine (Cain et al., 2013). With this in mind, the availability of cocaine to the foetus is threefold via placental blood flow, placental membranes and within the amniotic fluid (Cain et al., 2013). The foetus exposed to cocaine is likely to experience decreased intrauterine growth and thus be measuring small for gestational age (Cain et al., 2013; Janisse et al., 2014; Soto and Bahado-