

Substance Use in Pregnancy at the Mt Hope Women's Hospital in Trinidad

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ABSTRACT

Objective: To determine the prevalence of tobacco, alcohol, marijuana and cocaine use among mothers giving birth at the Mt Hope Women's Hospital.

Methods: All mothers giving birth at the Mt Hope Women's Hospital between March 1, 2008 and May 1, 2009 were invited to participate. A questionnaire was administered to elicit reported use of alcohol, tobacco, marijuana and cocaine. A meconium sample was collected from each newborn and analysed for the presence of cocaine and marijuana metabolites using Direct ELISA (enzyme-linked immunosorbent assay) Kits (Immunalysis Corporation).

Results: Of 839 mothers who enrolled in the study, 760 (91%) completed the questionnaire and 630 (75%) meconium samples were analysed. Maternal age ranged from 14 to 41 years. Fourteen per cent ($n = 106$) of respondents admitted to some form of substance use: alcohol, 52, tobacco, 52 and marijuana, two. None admitted to cocaine use but four meconium samples tested positive for cocaine and 14 for marijuana.

Conclusion: The prevalence of reported tobacco and alcohol use was the same (7%) and there was under-reporting of use of marijuana (two versus 14 found on analysis) and cocaine (none versus four on analysis). Meconium analysis for cocaine and marijuana should be done when there is a suspicion of drug use by the mother.

Keywords: Cocaine, marijuana, meconium, pregnancy, substance use

WIMJ Open 2014; 1 (1): 18

INTRODUCTION

Prevalence rates of the use of illicit substances in Trinidad and Tobago are not known but it is a well-documented phenomenon that drug use tends to follow and is influenced by drug shipping routes (1). In 2005, the Report of Narcotics Control Strategy by the United States of America (USA) Bureau for International Narcotics and Law Enforcement Affairs identified Trinidad and Tobago as one of the major trans-shipment points supplying North America and the United Kingdom (2). According to the estimates of the United Nations Drug Control Programme (UNDCP) Caribbean Coordination Mechanism (CCM), based in Barbados, about half the cocaine produced in South America, approximately 310 metric tons, passed through the Caribbean in 1998 (3). The same publication also reported that Trinidad and Tobago, although not a major trans-shipment point for marijuana, was a significant producer of the drug. Marijuana

production in Trinidad and Tobago is sufficient to meet domestic demand (3).

In Trinidad and Tobago, drug consumption surveys are not regularly performed. However, the National Secondary School Survey 2006 (4) reported that 7.4% of females (13, 15 and 17 year olds) admitted to using marijuana at some point in their life and 4% admitted to its use within the last year, while cocaine and 'crack' cocaine use were reported to be 0.76% and 0.71%, respectively. Lifetime use of alcohol among female students as described in this survey was reported to occur in 84% and tobacco use among female students was 24%. All of these substances have also been shown to affect the fetus (5–8) but there are no data on the prevalence of use of these substances during pregnancy in Trinidad and Tobago.

Drug use in pregnant women has implications for neonatal outcome. Neonatal anthropometric parameters – birth-weight, head circumference and length – are all negatively affected (9). Also, there is an increased risk of fetal distress (10), congenital anomalies and necrotizing enterocolitis. Neurobehavioural function in the first week of life was adversely affected uniformly among all women with suspected abuse as determined by positive urine toxicology (11).

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Adverse sequelae persist beyond the neonatal period. It has been demonstrated that there is a gradient relationship between increased prenatal exposure to cocaine and delayed expressive language acquisition (12). This association seems to hold for marijuana and tobacco use but more studies are required. Alcohol use in pregnancy is related to a spectrum of abnormalities referred to as the fetal alcohol syndrome (13). The objective of this study was to determine the prevalence of tobacco, alcohol, marijuana and cocaine use in pregnant women in Trinidad and Tobago.

SUBJECTS AND METHODS

Mothers who delivered their offsprings at the Mt Hope Women's Hospital, Trinidad and Tobago, between March 1, 2008 and May 1, 2009 were invited to enrol in the study and informed consent was obtained. Socio-economic, substance use, obstetric, neonatal and maternal data were collected. Mothers were given a collection sheet which was a one page self-administered questionnaire on which they would tick the appropriate response. For example, maternal drug use of: a) cocaine, b) marijuana, c) tobacco, d) alcohol, or e) none. Questions were also asked in a similar manner with respect to drug use by any of the spouse or co-resident. They would then place these forms in a secure receptacle on the ward or return to the researcher if they so wished. Completed forms were kept in a secured cabinet and data entry was performed using an encrypted secured computer at the Child Health Unit. A sample of meconium was collected from the newborn of each participant within the first day of life using a spatula and this was placed into a sterile container labelled with a unique identification number. The samples were kept on ice during transport to the Chemical Pathology Unit at the Eric Williams Medical Sciences Complex where they were stored at -20 °C until analysis. The meconium samples were analysed using the Cocaine Metabolite Direct ELISA (enzyme-linked immunosorbent assay) Kit (benzoylecgonine specific – Immunalysis Corporation) version 06/2001 to detect exposure to cocaine, while for marijuana, the Cannabinoids (THCA/CTHC) Direct ELISA Kit (Immunalysis Corporation) version 05/2001 was used. The extraction procedure is shown in Fig. 1. All newborn babies delivered by the participants were examined and anthropometric measurements and subsequent disposition of the infant were recorded. Ethics approval was obtained from the Ethics Committee of the Faculty of Medical Sciences, The University of the West Indies.

Data analysis

Statistical analyses were performed using the SPSS version 16.0 statistical software package. Frequency distributions were generated for all continuous variables. Pearson or Spearman's correlation was used to determine the relationships between substance use and other variables such as income. Significance levels were determined for all associations.

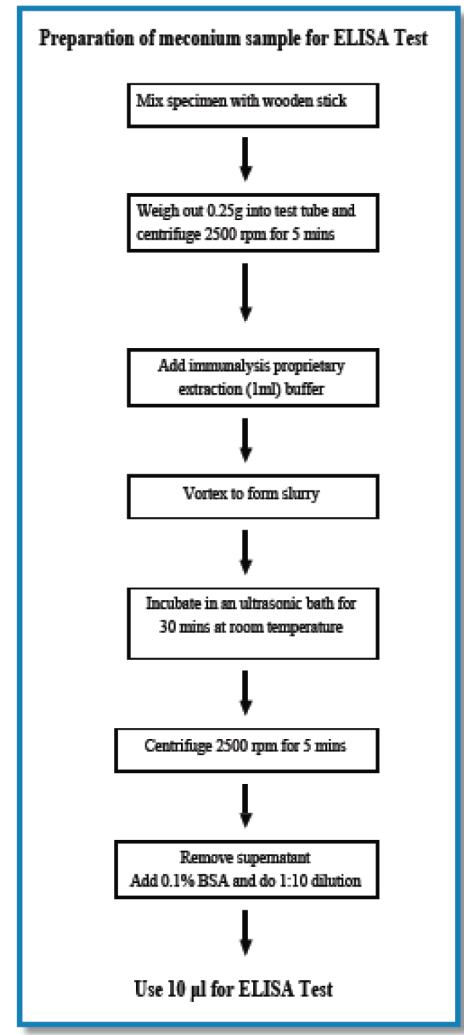


Fig. 1: Extraction procedure for meconium samples.

RESULTS

Completed data collection forms were available for 760/839 (91%) women and samples with sufficient quantities of meconium were obtained from 630 newborns and these were analysed for cocaine and marijuana metabolites. Maternal age ranged from 14 to 41 years and 47% (n = 357) were in a common-law relationship (Fig. 2). The father was the income earner in 51% (n = 387) of unions. Of the 760 women, 3.5% did not reveal their income, while 40% stated that they did not know. Two hundred and fifty women (33%) reported an income between 2500.00 and 5000.00 TTD¹ per month (Fig. 3). Twenty-two per cent (n = 167) of the women had only primary school education. One hundred and six respondents (14%) reported some form of substance use: 52 (6.8%) alcohol, two (0.3%) marijuana and 52 (6.8%) tobacco (Fig. 4). No one reported cocaine use.

Four meconium samples tested positive for cocaine metabolite. Pearson or Spearman's correlation was used to

¹ 1 USD = 6.30 TTD

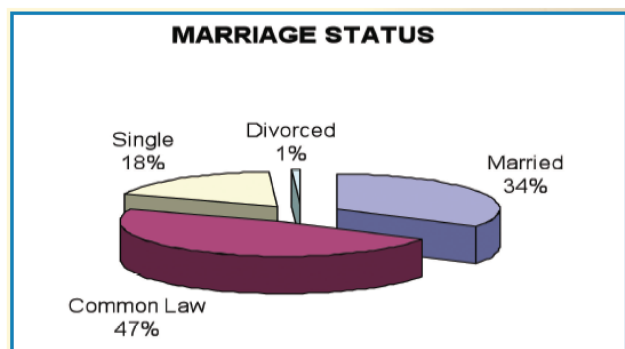


Fig. 2: Marital status of mothers.

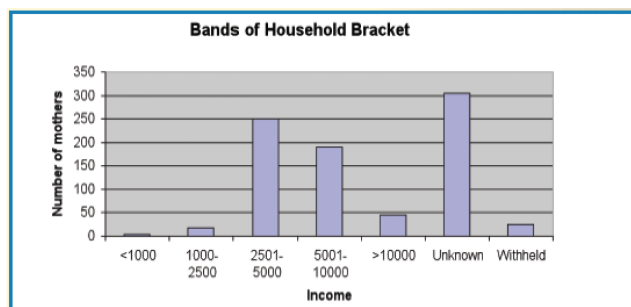


Fig. 3: Total household incomes of mothers.

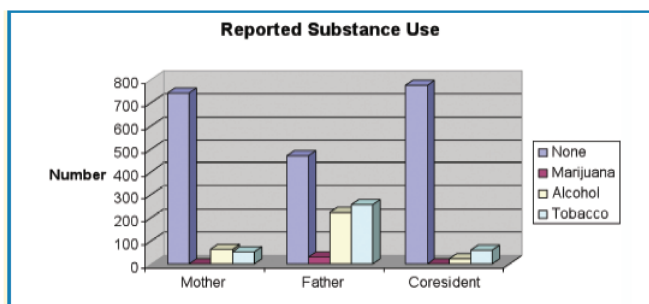


Fig. 4: Reported substance abuse among parents and co-resident.

determine relationships where appropriate. The likelihood of positive meconium test for cocaine was found to be positively correlated with increasing income ($r = 0.21$, $p = 0.02$). Fourteen samples were found to be positive for marijuana metabolite. The mothers who had these samples were not among those who reported use. These samples were not among those found to be positive for cocaine.

The prevalence of reported tobacco and alcohol use was the same (7%). A positive linear correlation was found between increasing age and a positive test for marijuana ($r = 0.125$, $p = 0.009$). Maternal substance use was found to be significantly associated with paternal substance use ($r = 0.356$, $p = 0.006$). There was a positive correlation between increasing educational achievement and marijuana use ($r = 0.096$, $p = 0.045$). The data also showed that when compared to non-married couples, if one parent in a marriage was using substances, there was a statistically significant increased risk that the other partner was also using substances ($r = 0.3$, $p = 0.0005$).

Women who admitted to substance use gave birth to infants with a larger chest circumference, 32.2 ± 1.8 cm (mean \pm SD) compared to non-substance use 31.6 ± 2.0 cm, $p = 0.019$. Head circumference was also larger, 34.1 ± 1.2 cm compared with 33.8 ± 1.5 cm for those who denied substance use but this was not statistically significant. Similar values were obtained for mid-arm circumference, 10.25 ± 1 cm and triceps skinfold thickness, 5.5 ± 1.2 mm in the two groups. Single women who smoked also gave birth to infants with smaller mid-arm circumference, chest circumference and triceps skinfold thickness. Males comprised 49% of neonates and, considering all neonates, their birthweights ranged from 540 to 5640 g, with a mean of 3037 g. The mean head circumference was 33.7 cm and mean crown to heel length was 49.6 cm. The birthweights of females ranged from 1800 to 5460 g with a mean of 3015 g. The mean head circumference was 33.7 cm and mean crown to heel length was 49.3 cm. There were no differences between males and females.

DISCUSSION

In the past, maternal and infant blood and urine samples collected invasively were used to screen for illicit drugs. However, there have been major advances in toxicology with the emergence and refinement of new laboratory techniques and markers. An example of this is the use of meconium (the newborn's first stool) to detect the presence of drugs and other toxins used by the mother during pregnancy (14, 15). Meconium is easy to collect and more sensitive than urine to test for the detection of many substances or their metabolites and is a sensitive indicator of maternal drug use.

Fourteen per cent ($n = 106$) of women reported some form of substance use during pregnancy. The prevalence of alcohol use was similar to that reported for pregnant women aged 15–44 years in the USA for 2002 [7% compared to 9%] (16). Tobacco use in this study was much lower than that reported in pregnant women aged 15–44 years in the USA for 2002 [7% versus 17%] but was the same as that for Black pregnant women in the USA, 7.3% (11). None of the women reported cocaine use in this study. However, meconium analysis for benzoylecgonine, a cocaine metabolite that persists in tissues for weeks, showed four (0.6%) samples were positive. Similarly, while only two (0.3%) women reported marijuana use, 14 (2.2%) samples tested positive for marijuana metabolites. There was therefore under-reporting of use of marijuana (two versus 14 found on analysis) and cocaine (none versus four on analysis). Sixteen (2.5%) samples tested positive for illicit drugs. This prevalence is similar to the 3% reported for pregnant women aged 15–44 years in the USA for 2002 (16). However, in the USA study, illicit drugs included inhalants, hallucinogens, heroin, or any prescription-type drugs used non-medically as well as marijuana and cocaine. Maternal reporting of marijuana and cocaine use cannot be relied upon for accuracy because of social stigma attached to the use of these drugs, their illegal status and the

unwillingness to accept responsibility in case of poor neonatal outcome.

Societal/peer influences appear to play a role in the incidence of substance use. The significant association found between maternal and paternal substance use ($r = 0.356$, $p = 0.006$) may be an indicator of the social/peer pressures influencing drug use. The data also showed that if one of the partners in a marriage was using substances, there was a statistically significant increased risk that the other partner was using substances as well ($r = 0.3$, $p = 0.0005$) when compared with non-married individuals. Whether the mother exerted influence on the partner or *vice versa* was not explored in this study but this underscores the importance of the social environment on behaviour and ultimately fetal exposure to potentially harmful substances. Increasing maternal age was found to be correlated with marijuana use ($r = 0.125$, $p = 0.009$). This is in keeping with findings in the literature that reported overall increase in lifetime prevalence of female marijuana use (1). Marijuana use has been reported to increase with education but then sharply falls once college level of education is achieved (17).

Single women who smoke had newborns with smaller chest circumference, mid-arm circumference and triceps skinfold thickness. This relationship is already well documented in the literature. However, in this study, the reduction in these anthropometric measurements was not found to be statistically significant among women who were married or in a common-law relationship. Marriage has been shown to be an independent factor that results in a lower rate of fetal loss and higher birthweight (18).

The prevalence of substance use in pregnancy when the data from the questionnaire and meconium testing for cocaine and marijuana metabolites were combined was 16%. Since these substances are known to have adverse effects on the fetus, it is important to seek to prevent antenatal exposure and to be vigilant in identifying those who are exposed. Meconium testing for the metabolites of cocaine and marijuana is useful for the diagnosis of *in utero* exposure of the newborn to these substances.

ACKNOWLEDGEMENTS

We wish to acknowledge the financial assistance from the Government of the Republic of Trinidad and Tobago, data analysis by Dr Derek Emmanuel, and the cooperation of staff at the Mt Hope Women's Hospital and the participants in the study.

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Submitted 20 Mar 2012

Revised 27 Jan 2014

Accepted 24 Feb 2014

Published 07 Apr 2014

Online: <http://myspot.mona.uwi.edu/wimjopen/58>

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