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Breastfeeding and maternal alcohol use: Prevalence and effects on child outcomes and fetal alcohol spectrum disorders

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ABSTRACT

Objective: Determine any effects that maternal alcohol consumption during the breastfeeding period has on child outcomes.
Methods: Population-based samples of children with fetal alcohol spectrum disorders (FASD), normally-developing children, and their mothers were analyzed for differences in child outcomes.
Results: Ninety percent (90%) of mothers breastfed for an average of 19.9 months. Of mothers who drank postpartum and breastfed (MDPB), 47% breastfed for 12 months or more. In case control analyses, children of MDPB were significantly lighter, had lower verbal IQ scores, and more anomalies in comparisons controlling for prenatal alcohol exposure and final FASD diagnosis. Utilizing a stepwise logistic regression model adjusting for nine confounders of prenatal drinking and other maternal risks, MDPB were 6.4 times more likely to have a child with FASD than breastfeeding mothers who abstained from alcohol while breastfeeding.
Conclusions: Alcohol use during the period of breastfeeding was found to significantly compromise a child's development.

1. Introduction

1.1. Breastfeeding, child health, and development

Breastfeeding is the safest and best method for providing optimal infant growth and development and protection from many diseases [1]. Internationally, professionals recommend exclusive breastfeeding until a child reaches six months of age with continued breastfeeding and complimentary foods until two years [2]. Breastfeeding during the early postpartum period varies widely by country [3] and is practiced by 43% of women internationally. Forty percent (40%) of infants six months or less are exclusively breastfed [1]. Breastfeeding is linked to improved infant survival rates, lower mortality, better growth, development, and cognitive and neurological outcomes [4–6]. For centuries extended breastfeeding has been considered the foundation of child health, immunity, growth, and development. While there is uniform support for the general health benefits of breastfeeding [1], in this study we examine a

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possible exception to the above rule. When alcohol is consumed by the mother during the period of breastfeeding, is child development compromised?

Exclusive breastfeeding for the first six months of life is promoted as the best option, but oftentimes supplementation with solid foods occurs early in infancy. In South Africa (ZA) solid food supplementation has been reported to occur frequently, but the foods provided are often low in energy and micronutrients [7]. Furthermore, many mothers have significantly inadequate dietary intake and are often malnourished themselves which may compromise child development [8,9]. Some studies in low socioeconomic status (SES) communities of ZA have found that a high percentage of infants (90% or more whose mothers initiated breastfeeding) are deficient in vitamin A and iron and are suffering from anemia even though their diets were often supplemented by solid foods at 3.6 months [10]. For low SES, ZA children ages 2–5 years, nutrient deficiencies have been found which may reflect poor quality diets high in carbohydrates, low in animal protein [11] and are linked to poor child development [12,13]. Furthermore, mothers in one of the five predominantly lower SES communities studied here have significantly inadequate dietary intake, and are poorly nourished on virtually all vital nutrients [8,9]. Therefore low SES and insufficient maternal and child nutrition may exacerbate any effects that alcohol introduced via breastmilk may have on the development of infants and young children.

1.2. Maternal alcohol consumption in the prenatal period

Moderate to heavy maternal alcohol consumption during the prenatal period adversely affects the health and development of a fetus and can result in a range of physical, cognitive, and behavioral problems known as fetal alcohol spectrum disorders (FASD). Proximal maternal risk factors such as the quantity, frequency, and timing of alcohol consumption (during gestation) affect the structure and severity of FASD traits [14,15]. Distal risk factors such as advanced maternal age, high gravidity, a low body mass index (BMI), low SES conditions, and individual maternal metabolic differences can further restrict growth, delay development, and increase the severity of FASD overall in alcohol-exposed fetuses [14,16–20].

1.3. Maternal alcohol use in the postpartum period

Upon pregnancy recognition many women reduce alcohol consumption or abstain; however, once the child is born, many women return to pre-pregnancy levels of alcohol consumption [21–23]. Few studies report the prevalence of maternal alcohol consumption while breastfeeding. Binge drinking of more than 5 drinks per occasion was reported by 29% of Norwegian mothers 6 months postpartum despite few women reporting alcohol consumption during pregnancy [24]. Among mothers in the United States (US), 36% of mothers who breastfed reported consuming alcohol [25]. Forty-seven percent (47%) of breastfeeding Australian mothers [26], and 20% of Canadian mothers reported alcohol consumption while breastfeeding [27]. In the Netherlands, 22% to 19% reported consuming alcohol during the breastfeeding period [21]. Therefore, alcohol use during the breastfeeding period may have international implications.

1.4. Alcohol delivered via breastmilk: difficult to measure but a limited effect?

The belief that alcohol consumption during breastfeeding has a deleterious effect on child development has been long held, but empirical evidence is not abundant [28]. Mechanistic studies have shown that low doses of alcohol are delivered to the infant via breastmilk (between 0.5% and 3.3% of the mother's dose, or a mean of $1.7 \pm 0.3\%$), and that infants have a limited capacity to oxidize alcohol [29]. And soon after maternal drinking, the mother's milk smelled (and tasted) of alcohol and infants reduced their intake of milk [29]. Another study concluded that: potential infant alcohol doses were low (3.0–58.8 mg (mean 13.4 mg)); predicted time required for milk to return to zero alcohol content was 175 min after drinking; health risks to the infant from a single dose were low; but nursing activity should be postponed for three hours after the maternal alcohol use of a dose equal to one standard drink [30]. Academy of Breastfeeding Medicine guidelines also recommend a two hour wait before resuming nursing, but state that "possible long-term effects of alcohol in maternal milk remain unknown" [31]. Therefore, frequent drinking, and heavy, binge drinking over time during the breastfeeding period appear to present a risk to the development of an infant and toddler, for alcohol is a potent teratogen and may also negatively affect development postpartum.

One study compared development in infants exposed to alcohol in the breastmilk after controlling for alcohol exposure during gestation [32]. No effect was found in performance on the Bayley Mental Development Index, but motor control measured by the Psychomotor Development Index was significantly lower in infants exposed to alcohol via breastmilk. After controlling for multiple confounders, the authors concluded that "alcohol ingested through breastmilk has a slight but significant detrimental effect on motor development, but not mental development, in breast-fed infants." [32] In another study the authors of the above study were unable to replicate these findings with Griffiths Scale intelligence test in 18 month-old toddlers. They concluded: that the dose of alcohol delivered to the toddler is small, and tests of very young children have a limited ability to detect small effects [33]. Therefore, most inquiries into the effect of alcohol delivered to infants and toddlers via breastmilk have concluded that the amounts transmitted to the child are relatively small, especially when compared to the higher concentrations of alcohol delivered to the fetus in the prenatal period. And the effects on the child may be rather inconsequential for cognitive/behavioral development if drinking is only occasional. But these previous studies have utilized rather small samples and the outcome variables were not as comprehensive as are the many physical and neurobehavioral traits that comprise a diagnosis on the continuum of FASD at later ages. Nor were the tests used with infants and toddlers sensitive enough or administered to children old enough for measuring significant outcomes. Physical or neurobehavioral effects may not be manifest and measurable until the later years.

1.5. Purpose of this study

This study utilized a large epidemiologic data set on FASD in six to eight year olds to examine the prevalence and duration of alcohol exposure to infants and toddlers via breastfeeding. Furthermore, we sought to objectively measure any effects on child development, independent of alcohol exposure during the prenatal period, that consuming alcohol during the period of breastfeeding might have on physical and neurobehavioral outcomes in first grade children. In the study communities women have proven to be very candid in reporting their alcohol use, and heavy binge drinking is common and practiced regularly each weekend among large subsets of the population, even among many pregnant women [15]. Furthermore, FASD are more prevalent in these communities than in any other general population in the world [34,35]. Therefore we sought to determine if alcohol delivered to developing children via breastfeeding has any measureable independent effect on development.