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The Effects of Smoking on Low Birth Weight Babies: A Cultural Influence?

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THE EFFECTS OF SMOKING ON LOW BIRTH WEIGHT BABIES: A CULTURAL INFLUENCE?

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INTRODUCTION

The persistence of low birth weight babies born to mothers who smoke continues to be a source of social concern. Recent research determined that a pregnant woman who smokes is 1.5 times more likely to deliver a low birth weight baby than a nonsmoker (Ventura et al. 2003). Low birth weight affects one in 13 babies each year in the United States and is a factor in 65% of infant deaths (March of Dimes, 2003). According to the March of Dimes Foundation, babies born at a low birth weight (2500 grams or less) are at a greater risk for mental retardation, cerebral palsy, impairments in lung function, sight and hearing. These babies may also experience problems regulating body temperature due to the small percentage of body fat related to the low birth weight. This can lead to growth retardation and problems with breathing mechanisms. Research has shown many times that there is a direct link with smoking and low birth weight. Therefore, if efforts are focused on smoking cessation, the effects of low birth weight can be reduced. There is currently research focused on what methods are effective and what populations would be affected. Perhaps smoking it is not only a social concern, but a matter of social acceptance. Recent research states that 67% of the women interviewed for a study in Perth reported that they had smoked regularly during their pregnancies (Gilcrist et al 2004). Conversely, only 4.2% of women in China smoke regularly (World Health Organization, 2000). If smoking is considered socially acceptable in certain areas, do the rates of low birth weight babies reflect this? The purpose of this study is to examine the epidemiological relationship between smoking and low birth weight in various countries to discover trends possibly related to culture.

Review of Literature

There have been many studies to document the association between smoking and low birth weight in infants. However, it is important to investigate whether cultural influences may be affecting these rates and the success of interventions aimed at smoking cessation.

New Zealand

According to the World Health Organization (WHO), the prevalence of smoking in women of New Zealand is around 25%. In a case-control study by Mitchell et al. (2002), researchers examined the association between smoking, nicotine, and tar in relation to infants born small for gestational age (SGA). This study included 844 cases that were defined as 37 weeks gestation and birth weight less than 10% of the sex-specific growth chart. The data was compared with 870 newborns of weight appropriate for gestational age. Infants who were born with congenital anomalies or didn't reside in Auckland

were not included in the analysis. The data was collected from interviews and obstetrical databases. The interviews contained questions such as "have you ever smoked regularly (more than one cigarette per day)," "did you smoke during your pregnancy," and "were you exposed to smoke during the pregnancy?" The important aspect of this study was the breakdown of smoking habits into preconception and the three trimesters of the pregnancy. This allows researchers to determine a correlation between cessation efforts at different points in the pregnancy.

Researchers found that 1,164 mothers smoked before pregnancy, and 1,178 smoked during pregnancy. They did not perceive any dose dependent response in the rates of low birth weight and increased number of cigarettes smoked. The data suggests that women who smoke are 2.45 (95% CI 1.76, 3.41) times more likely to have a SGA baby than non-smoking mothers. The data suggests that the only way to decrease the risk of having an SGA baby in smoking mothers is to stop smoking completely during the pregnancy. Another interesting fact is that researchers found that there is no difference in the odds ratio of women who smoke low tar or smokeless tobacco, which is often marketed as "safer" for the body.

The limitations of this study are minimal, as it is difficult to obtain 100% accuracy for smoking rates of the mothers. The study results could have been affected by recall bias; however, much of the data was accurate with obstetrical records that were also reviewed. The study also suggested that non-responders were more likely to have SGA babies and that they were also more likely to be smokers.

Culturally, a 25% prevalence rate would suggest that smoking is accepted in New Zealand . However, smoking is prohibited in bars, clubs, pubs, restaurants, offices, work places, shopping areas, and public transportation (University of Waikado, 2006). This suggests that much of the smoking is in the home and is more of a familial issue that culturally or social status related.

This study was well organized and was one of the most specific in regards to smoking habits during pregnancy. It is important to clarify smoking to participants, as many may believe that smoking once a week in a bar setting does not make them a "smoker." Finally, a key aspect to this study was the focus that was put of smoking cessation, rather than reduction during pregnancy. This is important information to pass on to expecting mothers.

Sweden

Researchers in Sweden also conducted a study to examine if the change in the prevalence of smoking had an effect on the number of SGA babies. This observational study used data from the Swedish Birth Registry, which accounts for 99% of all births in Sweden. The study defined SGA as <-2 Standard Deviations below the mean birth weight for gestational age on the Swedish growth curve or <2500 grams at birth. The sample consisted of 1,048,139 births from 1983-1992 throughout Sweden. The participants answered questions that would classify their smoking status as non, moderate, and heavy. Researchers point out that 95% of the population receives antenatal care before

15 weeks of pregnancy. This allows the data to be accurate and reliability and some generalizability.

The results showed that there was a correlation between smoking and SGA babies ranging from 2.8- 3.4%. There was a relationship between the amount of smoking as well. Moderate smokers were 4.9% more likely to have an SGA baby and heavy smokers 5.7%. The odds ratio calculated for moderate smokers was 1.7 (95% CI 1.7, 1.8) in 1093 and increased to 2.2 (95% CI 2.2, 2.3) in 1992. This is interesting because the reported prevalence has decreased from 29.4% of women reporting being daily smokers in 1983 to 21.8% in 1992, which, as the authors point out, could be from the lack of information from the records.

This study's limitations are similar to others that look at a similar subject. There is a possible recall bias with self-report which may underestimate the true prevalence of smoking in Sweden. There is also discussion by the authors about the stratification of the smoking status. It is difficult to stratify smoking status to include all possible levels of smoking for pregnant women. It may have been more effective to also determine the times in the pregnancy that the smoking was started or attempted to quit.

Sweden is a country that values a non-smoking environment. In fact, according the International Network of Women Against Tobacco, Sweden was one of the few countries able to meet the 2000 WHO goal of reducing the smoking population to less than 20%. There is a strong initiative to reduce smoking in public places, as well. As of June 1, 2005, all restaurants, pubs and cafes in Sweden were smoke-free. It would be assumed that these efforts have contributed to the decreased prevalence rate of smokers in Sweden a positive movement to decrease the number of SGA births.

Brazil

A cohort design was used to examine data collected in Brazil in both 1978 and 1994 describing the birth weight patterns of infants born in Ribeiro Pieto. The data was collected by trained personnel on the maternity floor and included the newborn's weight and mother's answers to questions on a standard questionnaire. The questionnaire addressed prenatal smoking as a simple "yes" or "no" response. The use of this nominal data does not allow for further explanation or expansion of the answers.

The data gathered in 1978 included 318,496 births and 1994 included 461,427 births. The researchers were also interested in the access to prenatal care and therefore adjusted the results to reflect prenatal care rates with smokers and non-smokers. Researchers assumed that smokers were less likely to seek out prenatal care. The data showed that access to prenatal care and therefore an opportunity to discuss smoking increased from 39.4%- 64% between the study years. The low birth weight prevalence, however, has increased as well, from 7.2-10.7%. Researchers suggest that the increase is related to the fact that there is still not enough prenatal interaction with the women to affect the smoking rates and in effect, affect the low birth weight prevalence. The 1994 data suggests a crude risk ratio of 1.18-2.17 (95% CI 1.18, 1.26 and 1.81, 2.61) for those mothers who smoke regularly. This data, however, was obtained from a simple yes or no response on the survey. It does not clearly indicate an acceptable odds risk ratio.

This study's major limitation for the smoking data is the lack of specificity related to the amount smoked and duration of smoking. Many mothers may be confused by the definition of a "smoker," especially considering the strong cultural ties to tobacco in Brazil. The strength of this study is that it is population-based and the information can be used to increase efforts to increase prenatal care rates and in effect, smoking cessation programs effectiveness.

According to information presented in a study by Lockschin et al. (1984), Brazil depends heavily on the tobacco industry. At that time, it was the 4th largest producer of tobacco worldwide and was the second largest exporter. 2.5 million people depended on the tobacco industry for employment and financial support. According to the WHO (2000), 29.3% of Brazilian women smoke. The Brazilian government is working to decrease this number by instituting regulations for cigarette and tobacco products. As of February 2002, it was a mandate that cigarette containers had 100% of one side of the packaging covered with health hazard warnings similar to that of the surgeon general in the United States. These packages often contain graphic pictures and include low birth weight as a consequence of smoking, which is encouraging to the effort.

China and Finland

A study of two population-based cohorts in combined in a report by Xu et al. (1998). This examines the smoking prevalence and rates of low birth weight between China and Finland. Researchers started data collection during the prenatal time for women living in the northern area of Finland, defined as Oulu and Lapland. The total number of births recorded for this study was 9479 births, which accounts for 99% of the total births in that region for that year. Similarly, the data from the Chinese cohort was derived from the birth records at the Qingdao Mother and Child Health Institute, which accounts for 98% of the births in that city's hospitals. Researchers reported that 2013 mothers, or 21.8% of the cohort in Finland, reported smoking. There is no data reported from the Chinese cohort regarding smoking because researchers report "it is believed to be a rare phenomenon among Chinese women, especially at child-bearing age" (Xu et al., 1998, p. 11). This fact makes it difficult to compare the findings between the cohorts. Smoking was classified as smoking at least one cigarette per day after the first two months of pregnancy. This is a clear definition, however, does not account for women who may not smoke EVERY day, and would therefore not fall into the "smoker" category. Results showed a 2.6% prevalence of low birth weight (1000-<2500 grams) in China and a 3.0% prevalence in Finland. However, when the number of pre-term infants is not included, the percentages are 1.5% and 1.1% respectively. It is important to note this as it would need to be further investigated to determine the factors that lead to pre-term birth.

The study suggests that the differences in prevalence rates between China and Finland are a direct result of socio-cultural interactions. By assuming that Chinese women are not smoking, they are eliminating some credibility from the final data analysis. It is difficult to state that it is a factor based on this study alone. According to the WHO (2000), 4.2 % of Chinese women smoke, as compared to 19% Finnish women. The culture of Finland suggests that women who smoke are often placed higher socially

and culturally. The government, however, has taken steps to ensure that smoking is less of a public health concern. For example, the Labour Protection Act regulates that women cannot be exposed to tobacco smoke in the workplace and smoking is banned in public places. To me, this suggests that much of the smoking and cultural attributes with smoking are founded in home.

Japan

Maruoka et al. (1998) designed a cohort study to review data from the Fukoka City Medical Association from 1987-1995. The study examined smoking as a potential risk factor for low birth weight. The researchers wanted to select statistically significant risk factors, and used a stepwise logistic regression to analyze the data. Smoking was defined as one or more cigarettes per day while pregnant. The study did not specify types of tobacco use or types of cigarettes smoked. The sample consisted of 1,097 low birth weight (<2500 grams) and 22,035 normal birth weight infants. The low birth weight sample accounted for 4.7% of the total births in the study data.

Results showed that 5.6% of the women reported smoking regularly throughout their pregnancies. Chi-square tests confirmed an association between low birth weight and smoking. The data was also analyzed to include a combination of risk factors and associated a 1.43 times greater risk of a low birth weight baby that was second in the birth order. There was a 1.3 times greater risk for nulliparas in Japan, compared with 2.0 and 1.7 in the United States and Sweden, respectively. The final data suggests a 4% population attributable risk between smoking and low birth weight infants.

The limitations to this study are similar to other studies in this subject area. It still remains an issue of self-report and recall bias. This is mentioned by the researchers in the discussion section. Also, the questionnaire is completed in a physician's office, which already assumes the woman is voluntarily seeking out prenatal care. This suggests a slightly increased likelihood that the woman is responsible about her health as well as the baby's.

According the WHO statistics, 13.4% of Japanese women smoke, which is different than what is reported by other studies that reference Asia as an area with a low prevalence of smoking. In Japan, smoking is not allowed on trains or public transportation, but is generally accepted in public places and restaurants.

United States

Ventura et al. (2003) designed a retrospective descriptive study to compare data from each state's birth records. The purpose of the study was to describe the trends in smoking rates and low birth weight rates in the United States. The sample included data from each state, excluding California and the District of Columbia. The researchers used data from the birth certificate application, which addressed prenatal smoking habits. The questions were limited to "did you smoke during your pregnancy?" and "if yes, what was the average number of cigarettes per day?" Once again, this may limit the amount of expansion and include more women in the sample size. These questions were first added to the application in 1989. The data analyzed accounted for 87% of the births in the United States during the years of 1990-2000.

The researchers were able to determine that the prevalence rates of low birth weight babies decreased over the 10-year period. In 1989, the prevalence rate was 19.5% compared to 12.2% in 2000. In fact, the incidence of low birth weight was double that of non-smokers, 10.4% and 5.6%, respectively. The study also accounted for maternal age and found that the rate of low birth weight babies was lower in women over the age of 25. Also, it was found that of those who smoked, 25.5 % of them did not complete high school, as compared to 2% in those who completed college. Those who started their prenatal care in the first trimester also had lower rates of low birth weight babies and were more likely to be non-smokers. The data suggests that there is no "safe" level of prenatal smoke exposure. Even "light smokers" (classified by 1-5 cigarettes per day) were at a 9.7% greater chance of having a low birth weight baby compared to non smokers.

Researchers noted that there may be a lack of more significant data based on the fact that the information is taken from birth certificate applications. This health concern is one that is continually being studied, and the authors note that a more comprehensive report of the data should appear soon in the literature.

In the United States, public health officials are working to decrease the number of smokers in general. However, there is little knowledge dissemination of the potential health effects for an infant born at a low birth weight. According the WHO (2000) statistics, 21.2% of women in the United States are smokers. This may be an understatement, again, related to the number of "social smokers." Culturally, there are not many repercussions for women smokers. It is common to see women smoking in restaurants, sidewalks, and driving down the street. The cultural acceptance of women smokers may directly relate to the increase in low birth weight babies.

CONCLUSION

This literature review provides a good insight into cultural aspects of smoking and its direct relation with low birth weight babies. It is clear that there are a higher number of low birth weight babies born in cultures where smoking is accepted. Based on this, it is important to target our efforts of smoking cessation at the entire population. There are many programs to encourage smoking cessation in effect today. The answer to this problem is a combination of prevention efforts.

First, it is important to target young women before childbearing age. This involves educating our middle school and high school-aged children and can encourage a healthy lifestyle that can continue into adulthood. Many children feel that they are resilient and that harmful effects of their actions "won't happen to them." It is for this specific reason that there needs to be a great deal of education about the cases that do affect their age groups. A campaign in the schools that reminds students of the harmful effects of smoking through classroom time and posters distributed throughout the school can help saturate the minds of these children.

Once women reach childbearing age and do become pregnant, we need to continue our efforts to encourage prenatal care. It is in these prenatal care visits that smoking cessation programs can be most effective. Research has shown that women are most likely to quit smoking while they are pregnant. As shown in the literature, a woman that stops smoking completely is at a decreased risk of an SGA baby than one who smokes

even lightly during the pregnancy. Therefore, we need to increase our access to prenatal care and continue to support smoking cessation efforts of prenatal programs that currently exist. Pregnant women need to be informed of the health risks from a low birth weight baby as well. Many women believe that it is advantageous to have a smaller baby and therefore an easier delivery time. Women need to be reminded of the risk of mental retardation, growth and developmental problems, as well as the time spent in a Neonatal Intensive Care Unit. This is not only a financial burden, but an emotional stress as well.

In the United States, efforts need to be more vocal to relay the message of the dangers of smoking and low birth weight babies. To compare a similar instance, a vast majority of women are aware of the harmful effects of alcohol during pregnancy. If we can convince women that smoking is just as harmful, perhaps the smoking rates and smoke exposure rates would decrease. Socially, our local governments are working to decrease the amount of smoke exposure in public places, which may discourage some smoking in public places.

Finally, an ideal situation would be to raise the price of cigarettes so that it is more difficult to smoke in general. Perhaps women who are preparing for a baby would be less likely to buy cigarettes if they were perhaps $10-$15 a package. This would not only benefit pregnant women themselves, but perhaps the other family members or friends that expose the pregnant women to second-hand smoke.

Researchers have identified a clear link between smoking and low birth weight. However, there have not been many clearly effective smoking cessation programs that have worked to decrease the prevalence of low birth weight babies in the United States. There are many steps that can be taken to promote non-smoking to pregnant women. As with any health risk, an elimination of the exposure leads to a decrease in the outcomes of the disease or condition. We must work to change our cultural practices of smoking to have an effect on the prevalence of smoking and therefore, the prevalence of low birth weight babies.

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