DHR Proceedings

Special Edition: Junior Clinical Research (2022), Vol. 2 No. S2
https://doi.org/10.47488/dhrp.v2iS2.64

COMMENTARY

# Health Effects of Exposure to Secondhand Smoke in Children: Pregnancy Through Preadolescence

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Received 07/21/2022
Accepted for publication 08/03/2022
Published 08/03/2022

Exposure to secondhand smoke during pregnancy through preadolescence is the leading cause of deaths worldwide. Although not nearly talked about enough, secondhand smoke (SHS) has the same death rate if not more compared to lung cancer caused by first degree smoking. In the following information we will dive into the research that looks into the effects of secondhand smoke on children during pregnancy through preadolescence.

## *Types of secondhand smoke*

### *Vapes/E-cigarettes*

Although commonly construed to be less harmful than your typical standard cigarette, e-cigarettes lie under the surface packed with humectants, colorants, nicotine, flavoring, and other bacterial/fungal products. In the rise of electrical cigarette use, the market only grows vastly as do the people affected by the toxicities found in the thousands of chemicals put into the nicotine filled cartridges firsthand or second handedly between the ages of 18-24 with 40% having not been regular cigarette smokers (1).

E-cigarette and vape use in the teen population and adults between 2011-2014 showed the increase of the development of cancer in the lungs of unborn children who are affected by the usage of adults or family members around them. The typical user inhales a cocktail of the following substances, Propylene Glycol and glycerol, flavor additives, nicotine, and in minute quantities, water. All of which can cause long term effects due to the direct inhalation of the harsh chemicals and metals that damage your airways and alveoli (2).

### *Cigars*

Secondhand smoke from cigars contains the same toxic chemicals that secondhand cigarettes smoke does (3). This type of smoke can cause or contribute to lung cancer and heart diseases (4). It also

https://doi.org/10.47488/dhrp.v2iS2.64

increases the risk and severity of childhood asthma, ear infections, and upper and lower respiratory infections in children (4). When an unborn child is exposed to secondhand smoke it increases the risk of getting an ear infection. When inhaled smoke irritates the eustachian tube which causes swelling and interferes with pressure in the middle ear, leading to pain, fluid, and infection, which are the most common causes of children's hearing loss (5).

### *Cigarettes*

When a pregnant woman smokes a cigarette or is exposed to secondhand cigarette smoking it plays a major role on postnatal outcome, it may cumulate negatively during lactation. The nicotine in the baby lasts up to 9 to 11 hours compared to the mother that lasts up to 3-4 hours (5). A baby gets less oxygen and food since cigarettes contain nicotine and it tightens up your blood vessels (6). The baby will get less oxygen when carbon monoxide gets into your bloodstream. Monoxide carbon exposure during pregnancy can cause severe damage, including intrauterine hypoxia, serious neurological damage, and even fetal death (6).

## ***Gender***

An extensive study made by pediatricians has shown that parents who smoke or have been near smoking areas, are far more likely to have females than males (7). The male gender, some studies show, are more disadvantaged due to the higher possibility of low birthweight and mortality. However, a study in Germany showed the contrary stating that ETS, smoke that comes from the burning of a tobacco product and is exhaled by smokers, affects the birth weight and risk of small-for-gestational-age of females more than males (8). Tobacco smoke and other harmful chemicals can keep the baby in the mother's womb from having enough oxygen which results in preterm delivery, harm, and even miscarriage in pregnant ladies (9).

According to an examination done in 2007 to figure out if maternal smoking affects the baby as it grew older, the birthweight of adolescents with exposure to maternal smoking were 0.26 kilograms lower than those who grew up around no smoke chemicals. In addition, tests on gender affecting the nicotine or plasma cotinine intake were not significant (10).

## ***Ethnicities***

Previous studies have found significant differences between ethnicities in exposure to second-hand smoke. With the most exposed ethnicities being African American non-Hispanics with 41.5%, followed by non-Hispanic Asians with 22.7%, 17.8% of non-Hispanic White, and lastly, 16.2% Hispanics (11). The African American population is more prone to being exposed to SHS, 66.1% of them are children aged 3-11(12). The Indigenous people are also exposed to secondhand smoke at a high rate. According to the study of Northern Plains, American Indian people that didn't smoke had a 28% higher level of cotinine (an alkaloid found in tobacco) than people in the general population. High exposure to secondhand smoke in the American Indian population is caused by the fact that state smoke free laws are not automatically enforced over the tribal nations or reservations, and most Indigenous areas do not have the resources to put in place smoke free protection and make sure they are enforced (13). CDC studies in 2011-2012 show that 6.2 million, out of 58 million, that were of Hispanic background were exposed to secondhand smoke. Approximately 29.9% of them were children aged 3-11(14). Studies taken on the Asian-American community showed that approximately 38.3% of secondhand smoke exposure happened at home (15). This percentage is lower compared to some of the other ethnicities. This is because 53.9% of Asian-Americans have a home smoking ban (16). Studies on white, non-Hispanic showed that 6.8 million out of 58 million non-smokers were exposed to secondhand smoke. About 34.3% of the population was children (17).

## ***Symptoms / Effects***

### *Pregnancy SHS exposure effects throughout Toddler years.*

According to cdc.gov, babies whose mothers smoke or are exposed to secondhand smoke while pregnant are at a higher risk to be born preterm (before the due date). One in every five children who are born preemies are born with a lower-than-average birth weight (9). Preterm birth is the leading cause in disability, disease, and sudden infant death syndrome (SIDS), or even in some cases miscarriage. A few other birth defects caused by being born preterm are undeveloped lungs, or a cleft palate. These defects that the unborn child can develop while in the womb can cause numerous issues that include asthma from the undeveloped lungs, high risk of ear infection, oral problems, and even heart problems caused by the cleft palate which is an opening or slit in the roof of the mouth and lip (9). This is only a few of many birth defects and problems that can develop when a child is exposed to secondhand smoking during pregnancy. As

https://doi.org/10.47488/dhrp.v2iS2.64

the Child ages during the first Twelve months of life (Span of infancy) the disabilities the infant may have can become chronic and chance of SIDS is at its peak. A study in relation to the infants underdeveloped lungs was done with 1062 mothers with infants who took a questionnaire on whether their infant experienced occasional wheezing, recurrent wheezing, or more frequent wheezing (MFW). 409 of the infants had one or more episodes of wheezing during their first 12 months of life. The infants from the study that fell under the category of MFW had been to the emergency room for not being able to breathe. When the child hits toddler age and begins to learn how to walk and talk there can be complications when learning these. As the child becomes more physically active, they are prone to get out of breath easier due to their underdeveloped lungs. The birth defects and disabilities that the child may have been born with can also cause learning disabilities (18, 19).

### *Ages 6-12*

The exposure of second-hand smoking in children causes various and serious health consequences. The main symptoms of the effects of being exposed to second-hand smoke are frequent and constant asthma attacks and constant fatigue in tasks as simple as walking. Children exposed to second-hand smoke tend to have frequent asthma attacks, this smoke triggers asthma attacks in children, even endangering a child's life. Some symptoms can be wheezing and coughing, in some cases it can even produce the improper development of the child's lungs (20,21). The first asthma attacks can be very severe but can worsen over time and cause new cases of asthma in the child if they are not attended. Even brief exposure to second-hand smoke can damage cells in ways that set the cancer process in motion. According to studies carried out by the (CDC), they show that those children exposed to second-hand smoking tend to have more ear infections, have more fluid in ears, and are often subjected to operations called Myringotomie. (A Miringotomy or Tympanostomy is an operation performed to drain the fluid accumulated in the ear and to balance the air pressure on both sides of the eardrum. In this operation, after aspirating the mucus from the ear, a small tube is inserted that allows air to enter and liquid to exit. This procedure is done to prevent delayed speech development in a child caused by hearing loss). Children exposed to secondhand smoking affects children more than it seems, in fact studies show that this can affect children even in development. Children exposed to secondhand smoking tend to be shorter than those who grow up in an environment free of tobacco-containing toxins. When the first symptoms of the effect of being exposed to second-hand smoking are not treated, throughout the child's development or even in his adulthood, he could have serious problems. Atherosclerosis can be a problem of many. According to studies done by the (NIH), atherosclerosis can begin very early in a child's life and worsen over time. It can lead to more serious problems such as blood clots, heart attacks and kidney problems among others (22).

## Long term effects

A study done on people with dementia showed that being exposed to secondhand smoke in adolescents has an increased risk of various forms of dementia and stroke later in life. There was a total of 2,993 participants in the study. Out of the 2,993 people, 1,683 (56.2%) were not exposed to secondhand smoke, while 670 (22.4%) were exposed to 0-1 packs (around 20 cigarettes) daily, and 640 (21.4%) were exposed to over 1 pack daily. The participants with the highest amount of exposure to secondhand smoke showed increased risk of stroke, AD dementia (Alzheimer's disease), and all dementia compared to those who experienced no exposure (23). A second study done on Korean adolescents exposed to secondhand smoke at an early age showed that different aspects of their mental health were affected. Including stress, insufficient sleep, depressive symptoms, and suicidal ideation. Secondhand smoke was reported at an alarming rate of 94.4% in their everyday lives including 20.0% at school, 23.0% at home, and 51.4% for public places. The end of the study showed Korean adolescents have a higher chance of experiencing poor mental health issues from being exposed to secondhand smoke (24,25).

## Mortality rate

Secondhand smoke with children is the leading cause of death worldwide. Due to secondhand smoke in children through the ages of 0- pre-teens there are more than 880,000 deaths each year. (26) Children exposed to secondhand smoke are more prone to get infant death syndrome. This disorder is known for happening unexpectedly, usually the children look healthy, but it is something that happens when you aren't aware. Other conditions that can cause death in infants and pre-teens are respiratory infections, asthma, and aural dysfunctions. Secondhand smoking can also cause coronary artery disease which affects the heart's arteries which supply blood to the heart, this causes plaque to build up and over time it covers the arteries which makes blood get in the heart with no problem. Coronary artery disease

has a 20-30% rise in individuals exposed to secondhand smoke that individuals with no exposure.

## Socioeconomic Status

Researchers from the CDC said 32.5% among women with incomes below the poverty line and 18.3% above the poverty line with this information we can hypothesize that pregnant women below the poverty line are at a greater risk for harming their child (28). In a different study published by a journal article by Charlotta Pisinger she states in her research children who live in lower socioeconomic status are strongly associated with secondhand smoke (29). In another research paper by Mohammad Hajizadeh, they found that exposure to secondhand smoke was higher in rural areas in every country (30). In a journal entry from the CDC, they state children who live in multi-unit residences like apartments are more likely exposed to secondhand smoke than children living in single unit homes.

## Conclusion

From the research provided we have gained more knowledge of the health effects of exposure to secondhand smoke from a woman's pregnancy throughout preadolescence. Secondhand smoke exposure may occur in many different places including at home, at a friend's or relative's home, in vehicles, restaurants, parks and playgrounds. The percentage of secondhand smoke exposure was similar for females and males and was higher for youth aged 3-11 years compared to youth aged 12-17 years. Secondhand smoke exposure was highest among non-Hispanic black youth and lowest among White and Hispanic youth. Secondhand smoke isn't really talked about yet is something parents should be aware of. They should protect their children from secondhand smoke since it can cause health issues and even long-term diseases throughout their lives.

## Acknowledgments

Dr. Monica Betancourt-Garcia, MD, Scientific Director; Melissa Eddie, MS, Program Manager; Xochitl Lopez, BS, Program Coordinator

## Funding

Funded by DHR Health Institute for Research & Development; DHR Health; Region One ESC GEARUP College Ready, Career Set! Region One ESC GEARUP College Now, Career Connected and Region One ESC PATHS

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