Occupational Risk in Cosmetology: Fetal and Reproductive Abnormalities

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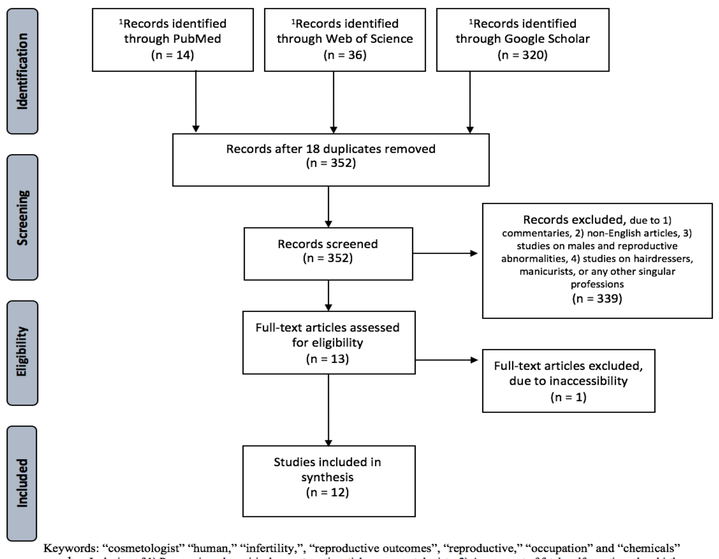
Introduction

The field of cosmetology presents a risk of reproductive anomalies such as infertility, spontaneous abortion, low birth weight, preterm delivery, and fetal death.[2] 'Cosmetologist' is a broad term to encompass individuals who provide beauty services ranging form hairstyling and facial treatments to nail treatments.[2] The vast majority of licensed cosmetologists are women of reproductive age, beginning careers in their early 20's prior to consideration of family planning.[4,8]

These women experience occupational exposures to various hazardous chemicals such as phthalates, toluene, xylene, formaldehyde, selenium, ethylene glycol monomethyl ether, and dimethylaniline, and many of which present as potential reproductive toxins.[1,4] Although the associated mechanisms of action are largely unknown, it has been shown that these chemicals may elicit an array of reproductive outcomes such as low birth weight, preterm birth, infertility, spontaneous abortion, menstrual cycle abnormalities, and alterations to reproductive/endocrine systems.[6,4,8]

Methods

Figure 1. Diagram 1: PRISMA Flow Diagram



Keywords: "cosmetologist" "human," "infertility,", "reproductive outcomes", "reproductive," "occupation" and "chemicals"

1. Inclusion of 1) Peer-reviewed empirical or systematic article on cosmetologists; 2) Assessment of fetal malformations, low birth weight, maternal health, menstrual cycle abnormalities, infertility, time to pregnancy, small for gestational age, and any other reproductive or fetal anomalies; 3) Females of reproductive age; 4) Cosmetologists who were expecting or experienced a live birth.

Objective

Does occupational exposure to salon chemicals increase the risk of fetal and reproductive abnormalities in fertile women in the field of cosmetology compared to other occupations?

Results

#	Topic of Study	Intervention	Study Design	Reference Study Population	Outcome
1	Cosmetology and infertility	Exposure to chemicals in salon products	Survey-based study	508 realtors, teachers, nurses, vendors, etc.) 448 cosmetologists (aged 21-55)	Cosmetologists are not at an increased risk of infertility.
2	Cosmetology and increased risk of reproductive orders	Exposure to chemicals in beauty products	Meta-analysis	19 studies on hairdressers and single occupation group (teachers, realtors, shop assistants and office workers)	No significant increased risk in small for gestational age (SGA), low birth weight, fetal death, or preterm delivery
3	Cosmetology and poor pregnancy outcomes	Regular exposure to salon chemicals	Questionnaire design	350 cosmetologist, 397 non-cosmetologists (aged 21-50): realtors, teachers, nurses, vendors, etc.	No significant association with miscarriage, infertility, stillbirth, preeclampsia or gestational diabetes)
4	Cosmetology and infertility	Exposure to toluene, nitrosamines, and formaldehyde	Literature review	General population (women of same age in other occupations)	No increased risk of miscarriage, infertility, adverse pregnancy outcomes, or menstrual cycle.
5	Cosmetology and low birthweight	Exposure to beauty products.	Nested case-control study	125 cosmetologists (children > 2,500g). 185 cosmetologists (children > 2,500g).	Cosmetology tasks studied were not associated with low birthweight.
6	Cosmetology and time-to-pregnancy	Exposure to organic solvents	Systematic review	Non-cosmetologist occupations	The evidence is not clear between TTP and the exposure to organic solvents.
7	Cosmetology and adverse pregnancy outcomes	Occupational exposure to chemicals and prolonged exertion)	Registry based-study	Hairdressers (10,622), cosmetologists (2490), teachers (18,594) as reference	Cosmetology may reduce fetal growth Are at higher risk for SGA babies (OR 1.53, 95% CI 1.10–2.12) & perinatal death (OR 1.36, 95% CI 0.62–2.98).
8	Cosmetology and adverse health outcomes	Repeated exposure to salon chemicals	Questionnaire design	450 cosmetologists and 511 women employed in other occupations	There were no statistically significant associations between cosmetology and the other adverse health outcomes.
9	Cosmetology and reproductive disorders	Exposure to salon chemicals.	Meta-analysis	19 studies on female hairdresser and cosmetologists	Increased risk of reproductive disorders (RRs of 1.10 to 1.40).
10	Cosmetology and reproductive or developmental toxicity of formaldehyde	Formaldehyde	Systematic review	18 human and experimental studies are reviewed	Association of maternal exposure with adverse reproductive effects. Increased risk of spontaneous abortion (OR 1.76, 95% CI 1.20-2.59, p=0.002).
11	Birth outcomes and maternal complications in cosmetologists	Chemical ingredients of beauty products	Population-based retrospective study	260,052 cosmetologists & 159,430 licensed manicurists in California	Increased risk for some maternal complications among cosmetologists. (OR 1.22; 95% CI 1.02-1.46).
12	Occupational menstrual cycle abnormalities	Chemical exposure	Questionnaire design	450 female cosmetologists & 511 non-cosmetologists (aged 21-55 years)	No significant associations between cosmetologists and menstrual cycle.

This review identified 12 studies from three electronic databases as indicated in Figure 1. Among the 12 eligible articles for the study, 4 articles established a relationship between a cosmetologist's exposure to organic chemicals and adverse reproductive or fetal outcomes, while 8 studies did not identify a statistically significant association. Cosmetologist participants were standardized based on characteristics such as age, race, smoking status, etc., to non-cosmetologist reference groups.

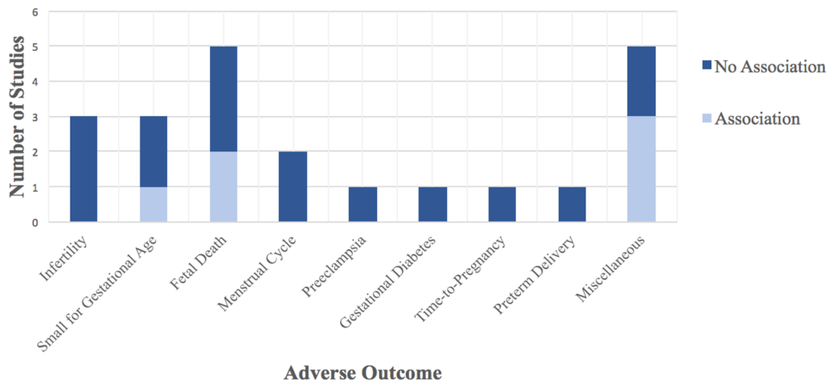


Figure 2. Proportion of studies finding association with specific adverse outcomes in cosmetology

Discussion

Strengths

1. Global data was collected, as such we are not limited to the exposure of chemicals present in only the United States.
2. Reviewed current literature on the association between cosmetology and reproductive outcomes by comparing with women of similar age in non-cosmetic professions.
3. Included studies accounted for race, smoking status, alcohol use, socioeconomic status, specific job tasks, education level, BMI, and other adverse pregnancy outcomes.

Our findings indicate a weak association and studies have identified similar insignificant association between chemical exposure and adverse fetal and reproductive outcomes.

Limitations

1. Numerous chemicals in hair and nail products limit the conclusions that can be made on the occupation as a whole.
2. Difficult to find an association between specific chemicals and the array of possible reproductive outcomes.
3. Studies of different methodologies and exclusion of non-English studies led to different conclusions of association.
4. The use of survey- and interview-based techniques may lead to biases.
5. Confounding factors were identified during the literature search that influence the association identified.

Future recommendations

Evaluate hairdressers and nail technicians separately to identify associations between categories of products and their resulting abnormalities. Conducting further toxicological research on the reproductive outcomes of cosmetologists can enact policy and regulation changes in the practice and product formation of beauty services. Conduct more clinical research studies.

Conclusion

Our findings indicate that there is not an increased risk of reproductive and fetal abnormalities among cosmetologists compared with non-cosmetologists. However, given the growing field of cosmetology in the world, there is importance in addressing this association through clinical research studies.

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