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Care of women smoking during pregnancy

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Thesis abstract

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Smoking during pregnancy is a world-wide phenomenon among women. Starting a family and giving the child a healthy life can encourage women to quit smoking, but motivation alone often isn't enough. That's why nurses need to know how to educate the mother about the effects smoking can cause for the baby and how to support the mother to quit smoking.

The aim of this thesis is to present the hazardous effects smoking during pregnancy can cause for the baby and the mother. The thesis also states how nurses can help to support the mother to quit smoking. The important factors for nurses were empathic attitude, adequate professional skills and presenting the mother with accurate information about the effects of smoking on the baby.

The results of the thesis are the effects of smoking during pregnancy and how to support the mother to quit smoking. The effects of smoking can be divided into two categories; effects on the baby and effects on the mother. The severity of the effects depends on the amount of cigarettes smoked daily.

Smoking during pregnancy can cause lower birth weight, respiratory problems and learning disorders and behavioural problems in the future. The most threatening effects on the baby's life are ectopic pregnancy, miscarriage and Sudden Infant Death Syndrome. Women who smoke during their pregnancy are likely to experience infertility later in life because smoking has anti-estrogenic effects.

The thesis also describes how smoking women felt about the support given by their partner, family and friends. Both the positive and negative experiences influenced on the mother's motivation to quit smoking. The toxic chemicals found in cigarettes, such as nicotine, carbon monoxide and heavy metals, and how they are absorbed into the foetus through placenta are also presented in the thesis.

Keywords: pregnancy, smoking, support

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1 Introduction

The thesis topic is care of women smoking during pregnancy. Thousands of toxic chemicals are found in the smoke of tobacco, and many of them penetrate the placenta. Nicotine, carbon monoxide and different polycyclic hydrocarbon and cyanide are some of the most hazardous of these chemicals. (Tikkanen 2008, according to Tiitinen 2014.)

Nurses working in prenatal clinics have a crucial role in preventing secondary smoking. They have a chance to educate the mothers on how exposing the baby to tobacco smoke can have hazardous effects that last for decades. (Jaakkola & Jaakkola 2012.)

Smoking is defined as an act of inhaling and exhaling the smoke of tobacco or a drug. Support is described as giving approval, comfort or encouragement, and be actively interest and concerned for the success of someone. (Oxford Dictionaries 21.4.2015.)

Pregnancy is defined as a state of developing embryo or fetus being carried in the female body, lasting for about nine months. It is divided into three trimesters, each roughly three months long. (Medicine.Net 2015.)

This thesis was done as a literature review. Data for the thesis was gathered according to the inclusion and exclusion criteria chosen for the thesis, which are further explained in chapter 7. The material was then read through several times and the important information was highlighted. Then the found information was divided into generic- and subcategories based on the subject field.

The thesis aims to present ways for nurses to support the mother to quit smoking. The most important tool in supporting the mother in quitting smoking was nurse's attitude. An empathic and understanding attitude of the nurse was found to be effective in supporting the mother to quit smoking. Another important tool was educating the mothers how to act in situations that tempt to smoke and how to act after a relapse.

As the results of this thesis; several hazardous effects of smoking during pregnancy were found in the literature review. Smoking during pregnancy doesn't affect only on the baby, but on the mother too. Smoking during pregnancy can result in lower birth weight, respiratory problems, learning disorders and behavioral problems in the future. The most hazardous effects are ectopic pregnancy, miscarriage and Sudden Infant Death Syndrome.

Because smoking has anti-estrogenic effects; mother who smoke during their pregnancy are likely to experience infertility in later life. Other risks for the mother are bleeding during pregnancy, abnormal placement or location of the placenta and ectopic pregnancy.

2 The toxic substances of tobacco

2.1 Nicotine

Nicotine acts as a contractor of the blood vessels. Nicotine absorbs from the mother's lungs into the blood circulation and travels into the fetus through the placenta and umbilical cord. This causes asphyxia, and the nicotine causes the womb, placenta and the blood vessels of the navel to contract which reduces the oxygen supply of the fetus. The nicotine concentration in the amniotic fluid is the same as the mother's. The fetus' ability to eliminate the nicotine from its system is also weaker than the mother's. (Vierola 2006; Klementti & Hakulinen-Viitanen 2013.)

The baby's exposure to tobacco can be measured by the cotinine of nicotine's metabolite, and blood- and urine samples from the baby. The most accurate and trustworthy measurement can be taken from the baby's hair. Even after the birth, the baby of the smoking mother releases rather big amounts of cotinine into the urine. Measuring the concentration of thiocyanate, another metabolite from nicotine, from the baby can be another way to examine if the baby has been exposed to tobacco smoke. If the mother has smoked heavily during her pregnancy; the baby can experience withdrawal symptoms, such as excessive crying and vexation. (Vierola 2006.)

2.2 Carbon monoxide

Carbon monoxide adheres into the fetus' hemoglobin and builds carboxyhemoglobin. This reduces the blood's ability to carry oxygen; causing a chronic asphyxia which enhances the harmful effects of nicotine in the tissues of the fetus. Carbon monoxide also causes direct toxic and teratogenic (disturbances of growth) reactions in the tissues of the fetus. (Vierola 2006.)

Carbon monoxide and its high concentration in the fetus are also one main reason why smoking causes sudden death of the fetus. With smoking mothers the risk of

sudden death of the fetus at the end of the pregnancy is 1.1-1.6 times bigger than with non-smoking mothers. A chronic exposure to carbon monoxide damages the respiratory tracks of the fetus, which increase the risk of Sudden Infant Death Syndrome (SIDD). (Vierola 2006.)

2.3 Heavy metals

The smoke of tobacco contains toxic heavy metals. Besides nicotine and carbon monoxide; cyanide, cadmium and lead are the main factors causing disturbances of growth of the fetus. Cyanide acts as a toxic tissue, disturbs the body function of the tissue and becomes thiocyanate in the fetus. This reaction consumes the B12-vitamin supplies of the fetus and amino acids. The children of smoking mothers tend to have elevated levels of lead concentration in the blood. (Vierola 2006.)

Cadmium can increase the risk of early delivery; leading to lower birth weight. Cadmium can also be transferred to the baby through the mother's milk after the birth (Nishijo et al 2001). Lead can cause miscarriage and stillbirth, but lower birth weight and premature delivery are also possible. However; the most serious effect of exposure to lead are learning and behavioral problems. (MotherToBaby 2014).

2.4 The absorption of the toxic substances into the body

The chemicals in the tobacco smoke have harmful effects on the fetus which is connected to the mother's blood circulation through the placenta and umbilical cord. The placenta cannot filter nicotine, carbon monoxide or heavy metals. They are released into the fetus, which can be exposed to greater concentrations of nicotine and carbon monoxide than the mother. The only way to prevent these harmful risks is quitting smoking. (Vierola 2006; Hakulinen-Viitanen, Lammi-Taskula, Ritvanen, Sarlio-Lähteenkorva, Pelkonen & Rantamäki 2012.)

3 The effects of smoking during pregnancy

3.1 Effects on the baby

The most critical period of development for the growing fetus is the first three months, which is known as the first trimester. The organs and tissues of the fetus are especially vulnerable during these three first months, and the last thing the growing fetus needs is a steady supply of poison coming from the mother and passing through the placenta into the fetus. Exposure to tobacco during the first trimester can result in significant or subtle damages to the unborn child. (Lewis & Brizer 2008.)

3.1.1 Weight and size

Low birth weight is one common effect of smoking during pregnancy. It means that the baby is estimated to weigh less than most other babies of the same gender, who are at the same stage of development. If the baby weighs less than 2.5 kg at birth, it means low birth weight. (Woolston 2015.)

The baby's birth weight can be shaved about a half-pound by smoking a package of cigarettes a day. If the mother smokes two packages of cigarettes a day during the pregnancy; the baby can become a full pound or lighter. (Woolston 2015.)

A child of a smoking mother can be 3-4 times smaller than a child of non-smoking mother. Depending on the amount of cigarettes smoked daily, a newborn baby can weigh 150-400 g less than normal. Smoking during pregnancy can also lower the baby's height by 6-8 mm until birth. At worst the baby's femur can be lowered by 1-2 mm at the fourth month of pregnancy by heavy smoking. If the fetus has been exposed to smoking, the fetus' head circumference, which is used to measure the growth of the fetus' head, can be 3-4 mm smaller at the end of the pregnancy. (Woolston 2015.)

3.1.2 Body and lungs

Babies who are born undersized tend to have underdeveloped bodies. The baby might have to spend some days or even weeks attached to a respirator, because their lungs may not be ready to work on their own. Delayed lung development or other adverse effects of nicotine can cause continuing breathing difficulties for the baby, even after being able to breathe on its own. If the mother has smoked during her pregnancy; the baby is vulnerable to asthma and allergies. (Woolston 2015.)

3.1.3 Brain function

Smoking during pregnancy can cause damages for the baby's brain. Some of effects don't show up right away, but may appear later in the child's life. Learning disorders, behavioral problems and relatively low IQs are typical effects of children of pregnant smokers. It is likely that the sons of smoking mothers become criminals in later life. If the mother has smoked more than 14 cigarettes a day, the child is likely to develop attention deficit hyperactivity disorder (ADHD). (Woolston 2015.)

3.1.4 Ectopic pregnancy

According to Vierola (2006), ectopic pregnancy is an abnormal stage where the fertilized ovum begins to develop outside the womb, usually in the Fallopian tube. This causes pain in the lower abdomen and bleeding at the beginning of the pregnancy. Usual symptoms of pregnancy can also occur, such as nausea or soreness of the breasts. Ectopic pregnancy can be detected when the ultrasound test cannot find the fetus' heartbeats, but the pregnancy test is still positive. Smoking increases the risk of ectopic pregnancy by 2.5-3 times, and smoking over 20 cigarettes per day makes the risk 3.5 times bigger.

Smoking, chlamydia or some other pelvic inflammatory diseases and operations of the hip area can increase the risk of ectopic pregnancy. The risk can also be increased by previously experienced ectopic pregnancies, childlessness, infertility

treatments and endometriosis. A copper intrauterine device itself doesn't cause ectopic pregnancy, but women using the copper IUD are likely to have ectopic pregnancy because of the device prevents pregnancies within the womb effectively. (Mäkinen, Yliorkala & Tapanainen 2011, according to Tiitinen 2014.)

If the ectopic pregnancy is detected early, it can be treated with medication called Methotrexate, and the Fallopian tube can be saved. A ruptured Fallopian tube causes heavy bleeding to the abdominal cavity, making the situation fatal which demand quick surgical operation. A copper intrauterine device can also increase the risk of ectopic pregnancy, so a woman using a copper IUD should be advised not to smoke. (Vierola 2006.)

3.1.5 Miscarriage

The more cigarettes the mother smokes, the risk of miscarriage at the early stages of pregnancy grows. Smoking increases the risk of miscarriage at least 1.3-3 times. Smoking can also cause so-called mini-abortions, where the pregnancy ends at a very early stage. (Vierola 2006.)

The main reason why smoking causes miscarriage is the lack of oxygen in the placenta caused by the carbon monoxide found in cigarettes. The concentration of estrogen- and progesterone in the placenta and womb are also lowered by smoking. The normal growth of the tissues of the placenta is also prevented by the cadmium, nicotine and carbon monoxide found in the cigarettes smoke. In addition; smoking mothers also have been noted to have abnormal structure of the small capillaries of the placenta, which causes the insufficient passing of oxygen from the mother to the fetus. The risk of miscarriage and premature birth increases because of smoker's lowered concentration of folic acids interferes with the dividing of the cells of the placenta. (Vierola 2006.)

3.1.6 Sudden Infant Death Syndrome

Sudden Infant Death Syndrome (SIDS), which is also known as cot death, isn't a disease, but the diagnosis given when a child under one year old dies suddenly. Even after extensive medical investigation; the cause of death can still remain unexplained. SIDS most often occurs during sleep, usually between hours of 10 at night and 10 in the morning. (Lewis & Brizer 2008.)

Babies, whose mother has smoked during pregnancy, have higher risk of SIDS because smoking can cause lower birth weight which is one cause for SIDS. The risks of SIDS can be lowered by putting the baby to sleep on his back and by the regular use of a pacifier until the age of one year old. (Vierola 2006.)

3.2 Effects on the mother

According to Lewis and Brizer (2008), women who smoke during their pregnancy can be exposed to many other problems than just fertility problems. The risk of developing cervical cancer is four times greater for women who smoke than to non-smokers. Menopause occurs earlier in smoking women. Smoking can also cause many manifestations of ageing, for example wrinkles.

3.2.1 Effects on fertility

A woman's ability to conceive can be damaged by the variety of toxins from the cigarette smoke. Even exposure to second-hand smoking can reduce fertility just as active smoking. (Lewis & Brizer 2008.)

For smoking women conception takes longer and the risk of miscarriage increases. If a woman smokes more than 20 cigarettes a day, her fertility is about half from a non-smoking woman's fertility, and her risk for childlessness increases for about 35 %. (Vierola 2006; Tupakkaklinikka 2.6.2015.)

Smoking women are more likely to experience irregular menstrual cycles, skipping of menstruation and irregular detaching of the ovum. If the smoking woman

doesn't get pregnant within a year after quitting the contraception, she should confirm the detachment of ovum by making an ovulation test. A hormone-medication can be given in a case when the ovum doesn't detach. (Vierola 2006.)

Nicotine and chemicals are gathered into the follicles in the ovaries. One main reason for the detachment of the ovum and infertility can be the gathering of cadmium. Smoking also lowers the levels of estrogen and progesterone which delays the conception. For smoking women the implantation of the ovum to the womb is also disturbed. (Vierola 2006.)

3.2.2 Other hazardous effects

Smoking during pregnancy doesn't just cause all sorts of health and mental risks for the fetus, but it can also put the entire pregnancy and sometimes even the mother's life at risk. Pregnant smoker in general have higher rate of problems in pregnancy and delivery. Some typical risks include bleeding during pregnancy, abnormal placement or location of the placenta and ectopic pregnancy. (Lewis & Brizer 2008.)

Smoking can also cause several health risks for women in general. Smoking can increase the risk of developing serious diseases, such as several cancers, heart diseases, respiratory diseases, metabolic syndrome and diabetes, high blood pressure and high cholesterol. Other risks include dermatologic diseases and other health effects, such as osteoporosis, tooth loss and gum disease. (Pregnets.Org 21.8.2015)

4 Smoking and breast feeding

According to Terve.fi (2.6.2015), a smoker-mother's nicotine concentration in the breast-milk is five times to the concentration in the blood. If the mother smokes, it usually anticipates a shorter period of breast feeding. The milk of a smoking mother tastes bad (Tupakkaklinikka 2.6.2015). Smoking decreases the secretion of milk by 30 % and the child gains weight more slowly. A smoking mother also passes the toxics of the cigarettes along to the baby through the milk. Babies of heavy smoking mothers (20 or more cigarettes a day) can also develop nausea, vomiting, stomach problems and diarrhea. (Vierola 2006.)

Nicotine and other chemicals, such as cadmium, are released into the breast milk. If the mother smokes, her breast milk's vitamin C concentration is half from normal, which increases the child's risk for allergies. The amount of smoked cigarettes and the time between the last cigarette taken before breast feeding effects on the nicotine concentration of the mother's milk. The half-life of the nicotine concentration in the mother's milk is about 1.5 hours. The nicotine concentration is highest right after smoking, so the mother should wait at least 2.5 hours before breast feeding. That's when the nicotine concentration has fallen a quarter from what it was right after smoking. (Vierola 2006.)

According to one research; 45 % of smoking mothers' children experienced colic daily, while only 26 % of non-smoking mothers' children had any abdominal pain. The children of smoking mothers also experienced more crying. While mothers usually breast feed their babies for more than six months, smoking mother were less likely to breast feed their babies for that long due to their indifferent attitudes towards breast feeding. The mother's negative motivation towards breast feeding is one reason for the shorter period of breast feeding among smoking mothers besides the physiological attributes, such as smell and taste. (Vierola 2006.)

Eight year-old prematurely born children who received breast milk were shown to do better in intelligent test than children who didn't receive mother's milk. Children who received breast milk for a longer time were also less likely to develop diabetes. Cancers occurring during childhood are also less likely to occur in children who have been breast fed for a long time. (Vierola 2006.)

5 Ways to support the mother to quit smoking

According to Tikkanen (2008), if smoking is stopped at the beginning of pregnancy, certain risk such as premature birth and rupture of the placenta, can be reduced. The growth of the fetus can become normal if the smoking is stopped before the mid-term of pregnancy.

In a study performed by Koshy, Mackenzie, Tappin and Bauld (2010), smoking pregnant women were interviewed about the support they received from their partner, family and friends. The women experienced both positive and negative influence, and their motivation to quit smoking was influenced by the experiences of their family members and friends.

The attitude of the nurse is also one important tool in supporting the mother to quit smoking. The mother is more likely to become motivated in quitting smoking, if the nurse shows empathic and understanding attitude and offers practical advices. (Klementti & Hakulinen-Viitanen 2013.)

If willpower alone isn't enough to motivate the mother to quit smoking; nicotine-replacement therapy should be considered. In nicotine-replacement therapy the cigarettes are replaced with nicotine-products, such as chewing gum, which reduced the nicotine concentration in the blood. Nicotine-replacement therapy also prevents toxic chemicals from entering the body. (Vierola 2006.)

5.1 Support of the partner

Whether the partner smokes or not tends to influence on the mother's motivation to quit smoking. In a study founded by Koshy et al (2010); 24 women who smoked during their pregnancy were interviewed about how their partners, close family and friends influenced on their motivation to quit smoking. Partners' attitudes towards smoking had both positive and negative influence on the mother's motivation.

Smoking partners were seen as a negative influence because of providing temptation and reminding smoking as a couple activity. However; if the smoking partner

attempted to quit smoking along with the mother, it was seen as a positive influence. Even not smoking in the presence of the mother was considered as positive support. Non-smoking partners also provided negative influence by “nagging” and adding pressure on the mother. (Koshy et al 2010.)

When fathers are present at the ultrasound examinations or at appointments at maternity clinics – or policlinics, they should be involved in the care. The health care personnel should provide the father with information about the withdrawal care related to smoking. The mother can't use withdrawal-medications bupropion (Zyban) or varenicline (Champix) during pregnancy or breast feeding, but they are suitable for the father. (Vierola 2006.)

5.2 Support of the close family

In the study founded by Koshy et al (2010); close family members also had influence on the mother's motivation to quit smoking. Especially mothers, sisters, mothers-in-law and sisters-in-law were considered to have most influence on the mother. Mothers who smoked tended to have smokers in the close family.

Family members provided both positive and negative influence on the mother's cessation efforts. Receiving encouragement from their mothers was considered as positive influence. However; individuals offering cigarettes and social situations where family members smoked had a negative influence on the mother. If a family member had experience of smoking during pregnancy; the mothers felt less motivated to quit smoking themselves. (Koshy et al 2010.)

5.3 Support of friends

Women experienced similar influence from friends as from partner and family members. Non-smoking and smoking friends provided both positive and negative influence on the mother. Women received valuable advises and support from friends who were ex-smokers. However; mothers also experienced being accompanied by friends who smoked as a hindrance to their motivation. Furthermore;

witnessing a healthy baby of a friend who had smoked during her pregnancy also reduced the mother's motivation in quitting smoking. (Koshy et al 2010.)

5.4 Support of the nurses

According to Käypähoito (21.4.2015) withdrawal care given by nurses, public health nurses and other professionals of health care can be efficient. Nurses working in prenatal clinics have a chance to educate the mothers about the hazardous effects smoking can cause for the baby (Jaakkola & Jaakkola 2012).

When meeting with a patient the nurse should discuss about smoking. Having a family can be a great source of motivation to quit smoking, but it can also create questions, worry and guilt. That's why it is important for the nurses to be empathic and give expressive care and motivating interviews, for example. Success in quitting smoking can be increased by practical guidance; where the mother is taught to anticipate situations that tempt to smoke and how to act after a relapse. Guidance given by the counselor and encouragement are also useful tools. (Klementti & Hakulinen-Viitanen 2013.)

When the nurse meets the patient for the first time, she should interview the woman about her smoking habits. If the woman confirms she is smoking despite her pregnancy, the nurse should then interview how willing she is to quit smoking. If the mother is unwilling to quit smoking, she should be given information about the effects smoking causes for the baby. But if the mother is willing to quit smoking; she is given information about the different care and support that can be given for her, along with written information. At the same time, the mother should do the Fagerstrom test to determine the level of her nicotine-addiction. Then the nurse reads the results to find out which cessation-treatment would be most suitable for the mother. (Laasonen 2010.)

5.5 Nicotine-replacement therapy

Sometimes willpower isn't enough to help in quitting smoking. Especially if the mother has started smoking at a young age and has smoked for a long time; it is likely difficult for the mother to quit smoking. Medical evidence supports nicotine-replacement therapy if the other option is continuing smoking during the pregnancy. If the mother otherwise cannot quit; a replacement therapy should always be considered. (Vierola 2006.)

Nicotine-replacement therapy is always considered a better option than actual smoking, even for those who are already pregnant or breast feeding. Products that have short-time effects, such as nicotine gum- or tablets, should be used instead of those with long-time effects, such as nicotine patch. Nicotine-replacement therapy has fewer risks for pregnant women than actual smoking. Replacement therapy is recommended despite the possible risks for the fetus. The beginning of the pregnancy is the best time to begin pregnancy and it should last for a few weeks. (Vierola 2006.)

The growth and development of the fetus is exposed to fewer risks than during actual smoking. The nicotine concentration of the mother and the fetus is much lower during the replacement therapy. But the main point is that the nicotine-replacement therapy doesn't include carbon monoxide, tar or other harmful toxics found in tobacco. Nicotine-replacement therapies can also double the chances of quitting smoking in total. The mother shouldn't continue smoking while she uses nicotine-replacement products. (Vierola 2006.)

Reducing the craving to smoke and withdrawal symptoms are the main points of the nicotine-replacement therapy. The fetus can be saved from the harmful toxics of tobacco for a time of 7-8 months, if the replacement therapy is started at the beginning of the pregnancy. During the nicotine-replacement therapy the fetus can be saved from lack of oxygen, caused by carbon monoxide, and other chemicals that are harmful for the growth of the fetus. (Vierola 2006.)

Nicotine-replacement therapy is recommended for women who have begun to smoke at young age and smoke 10-15 cigarettes a day. If the woman smokes her

first cigarettes about 5-15 after waking up, it can be seen as strong nicotine-addiction. Well-motivated mother are likely to have the best benefits from the nicotine-replacement therapy. (Tupakkaklinikka 10.11.2015)

Smoking should be stopped once the pregnancy-test is positive. At the beginning of pregnancy the feelings of nausea can be beneficial because the mother might not feel like smoking. (Tupakkaklinikka. 10.11.2015)

In nicotine-replacement therapy the daily smoked cigarettes are replaced with up to the same amount with nicotine gums or with tablets placed under the tongue. When using 1-2 mg tablets or 2 mg nicotine gum 6-8 times a day; the nicotine-portion fetus receives is about 20 % or less from what it would get from 10 or more cigarettes a day. Nicotine patches are not recommended during pregnancy, because they raise the nicotine concentration within the fetus for several hours or even for a day. If the mother is uncertain; she should discuss with a doctor familiar with nicotine-replacement therapy. (Vierola 2006.)

The use of nicotine-replacement products should be kept in minimum during pregnancy, and the mother should be rid of cigarettes within a month. However; the promising start of a cigarette-free pregnancy shouldn't be risked because of a too short treatment. (Vierola 2006.)

6 The Goals and Purposes of the Thesis

6.1 Goals

The main goal of the thesis is to find out what kind of risks and effects smoking can cause for the baby. Two more goals were also set: to find out how the nurses can support the mother to quit smoking and what kind of care can be offered to the mother.

6.2 Purposes

The purpose of the thesis is to educate nurses about what kind of care can be given to the mother in order to help her in quitting smoking.

6.3 Research questions

The research questions of the thesis are:

- How does smoking during pregnancy affect on the baby?
- What kind of damages can smoking during pregnancy cause for the baby?
- What kind of support can be given to the mother in quitting smoking?

7 Methodology

7.1 Literature review

The data collection method chosen for this thesis is a literature review. According to The writing center (2012) a literature review discusses published information in a particular subject area, usually in organized pattern; combining both summary and synthesis. Literature review gathers information from many sources and presents the reader with up-to-date information, without including personal opinions (Cronin, Ryan & Coughlan 2008). Literature reviews seeks to summarize the literature that is available on the topic. The reader doesn't have to access all the individual research reports, because literature review makes sense of the body of research and presents an analysis of the available literature. (Aveyard 2010.)

The process of literature review includes five steps. The first step is choosing the topic; followed by the second step which is searching the literature. The third step includes reading and analyzing the literature and then writing the review. A clear strategy where the research questions are considered at every decision should be included in the data searching and selecting process. Writing the review is the fourth step and the final step is writing the references. (Cronin et al 2008.)

7.2 Data collection process of the thesis

The data for this thesis was collected from scientific article- databases CINAHL and Julkari using keywords smoking and pregnancy as search words. When Julkari was used, the keywords were in Finnish: raskaus and tupakointi. Combining these keywords was used to eliminate irrelevant data from the found material.

Scientific evidence-based books were also used to collect the data, using the keywords smoking and pregnancy as search words. The books included a short introduction of the authors, where it was stated that the authors were professionals of medical science. The books were also published by unions of doctors or other medical professionals.

7.2.1 Selecting a review topic

Choosing the review topic was the first step of the thesis data collection process. The topic of the thesis was chosen because of the author's own interest in the topic of pregnancy, especially when they are risks related to it, such as smoking. Women who smoke while aware of their condition create a lot of risks for their growing fetus. The topic is important for prenatal health care, because there nurses need to know how to educate women about the risks of smoking during pregnancy and how to support them to quit smoking.

7.2.2 Inclusion and exclusion criteria

In order to find wanted material and limit the data results to a more appropriate size; inclusion and exclusion criteria were chosen for the thesis. Some restrictions were made to find material from the right area of knowledge, such as excluding alcohol and drugs from the topic.

The material was gathered from both online sources, such as CINAHL and Julkari, and written scientific evidence-based books and articles. Both of these sources were restricted into a timeline between the years of 2004 and 2014, so that the material would not be too outdated. The languages that were relevant for the material were English and Finnish. All the material also had to be in full text in order to be chosen. The material also had to be peer-reviewed in order to be chosen for the thesis.

If the articles were not full text; they were not chosen because the information they included was limited. Materials that were published before the year of 2004 were not chosen because the information found in them was already outdated. Also; the material in other language than English or Finnish were not chosen. These selections are listed in table 1.

Inclusion	Exclusion
Published between years 2004-2014	Published before 2004
English or Finnish language	Other languages
Full-text	Articles with only abstracts available
Peer-reviewed articles	Non-peer-reviewed articles

Table 1. The inclusion and exclusion criteria used in the data search of the thesis.

7.2.3 Keywords

In order to define a certain area of knowledge; well-defined keywords were chosen for this thesis. The words smoking and pregnancy were actively used in the data search, and were the basis of the thesis area.

Smoking is the act of inhaling and exhaling the smoke of tobacco or a drug (Oxford Dictionaries 2015).

Pregnancy is a state of a developing embryo or fetus being carried within female body. Pregnancy lasts for about nine months, measured from the date of the woman's last menstrual period. It is divided into three trimesters, each roughly three months long (Medicine.Net 2015).

Support is giving approval, comfort or encouragement, and be actively interest and concerned for the success of someone (Oxford Dictionaries 2015).

When the Finnish database Julkari was used, the keywords were the same, but in Finnish. These keywords were raskaus ja tupakointi. The main key words smoking and pregnancy were often combined into smoking during pregnancy which helped to find more relevant data.

7.2.4 Searching the literature

Part of the search was done on computers, using CINAHL and Julkari as databases. Keywords smoking and pregnancy were used to find material. The found material was then limited by the word support to exclude the irrelevant material for the thesis.

Another part of the search was done in libraries. In libraries; books under the category of pregnancy were searched. The books included a short introduction of the authors; confirming that they were professionals of medical science. The books were often published by unions of doctors or other professionals of medical science.

Data search from CINAHL

Information was searched from the full text database CINAHL by the use of keywords smoking and pregnancy. Sometimes the keywords were combined into smoking during pregnancy in order to find more relevant data. 281 articles were found by the combination of these keywords. The language limitation wasn't necessary at this point, because all the articles were in English language. These results were limited by choosing full text articles and academic journals. Next limitation was set by limiting the publications from years 2004 to 2014. 45 articles were found from these inclusion and exclusion criteria. Article headlines and abstracts were then read to limit the data. 1 article was found useful from CINAHL and used in the thesis. That one article was found relevant for the thesis, because it included information about the subject field. All the other articles were irrelevant, because the information they included was out of the subject field. The process of data search can be seen in figure 1.

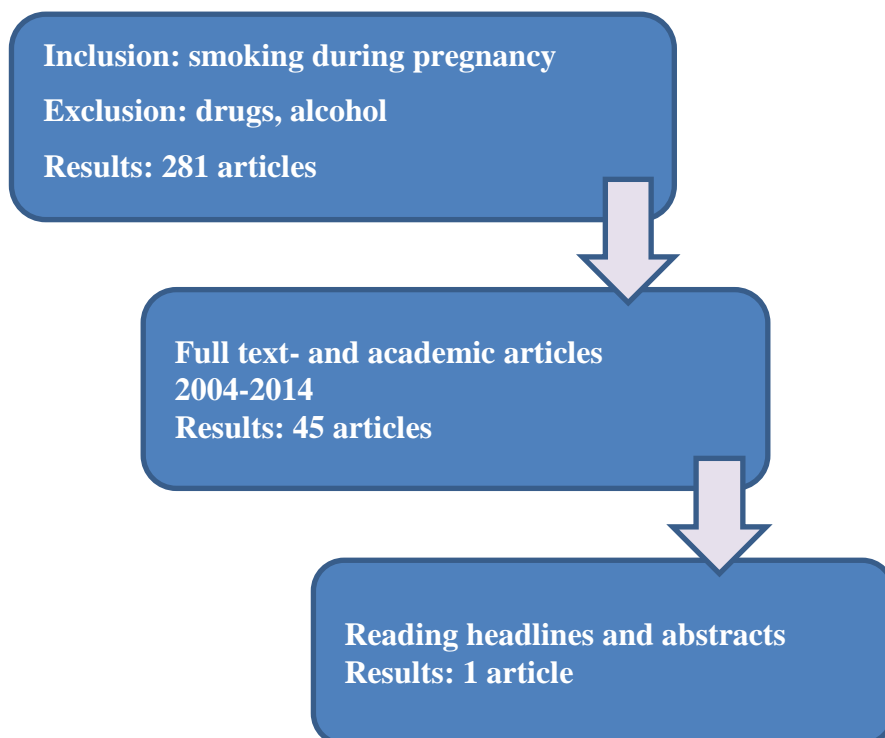


Figure 1. Data search from CINAHL

Data search from Julkari

A Finnish database Julkari, which publishes online booklets from different Finnish health organizations, was also used to find material for the thesis. The keywords *raskaus ja tupakointi* were used in the search. *Terveystieteiden tutkimuskeskus (THL)* was then chosen as the publisher; resulting in 86 articles. No other limitations could be done at this point; because Julkari database didn't have that option. The headlines and abstracts were then read to find relevant material. 2 booklets were found useful for the thesis. The other articles were irrelevant because their information was out of the subject field. The process of data search can be seen in figure 2.

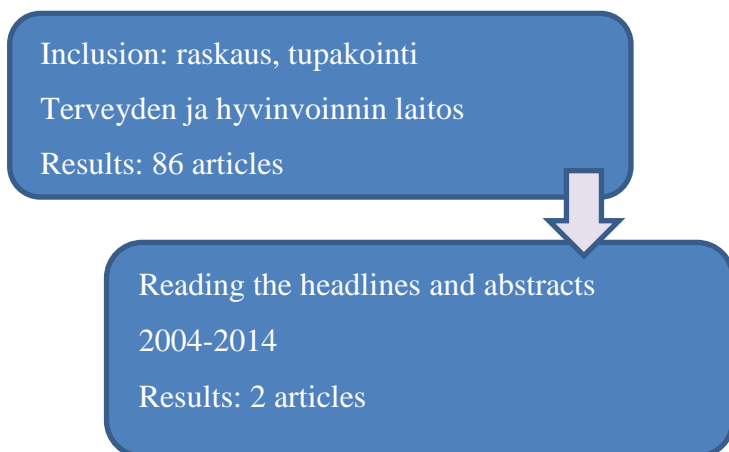


Figure 2. Data search from Julkari.

Data search from Library

Books under the category of pregnancy were chosen from a library. The titles of the books were read in order to find data from the right area of knowledge. Then the authors of the books were checked to limit the data into scientific evidence-based material. Then the abstracts and tables of content were read to eliminate the irrelevant data. Two books were found useful from library and used in the thesis.

A free search

Sometimes the data was found from the sources of previously chosen data. As the material from the previously found articles and books was read through; the original sources were checked too. Some of these original sources were searched from the internet, and 5 were found relevant for the thesis. These materials were published by Finnish health care organizations. 11 more online sources relevant for the thesis were found by using the keywords used previously.

7.2.5 Results of the search

In order to find relevant information; the found data was gone through after the search for the data was done. Reading the headlines was the first step to find the relevant data. The next step was reading the abstracts to eliminate the irrelevant data.

When the databases CINAHL and Julkari were used; several articles under the subject of pregnancy were found. However; after reading the headlines and abstracts, most of these articles were found irrelevant for thesis. Most of these articles didn't include the subject of smoking, or spoke very little of it. These articles also focused on other subjects, such as illicit drugs, alcohol or certain diseases. Since these articles didn't offer answers to the research questions, they were found irrelevant for the thesis.

In scientific evidence-based books; the headline was also read first in order to find relevant data. Then the table of contents was read to eliminate the irrelevant data. The data was then skimmed through to make the final elimination.

The books and articles were read through multiple times. The important information was highlighted at the same time. Once the data was collected, the author began to group it into categories.

8 Content analysis as data analyzing method

8.1 Content analysis

Qualitative and quantitative data can both be used in content analysis. Content analysis has three phases. The first phase is preparing the data and analyzing the details. The next phase includes reading the data and making sense of it. Reporting the information that has been found is the final phase. (Elo & Kyngäs 2008.)

8.2 Data analyzing process of the thesis

The importance of the first phase is finding the relevant information so that the database can be created for the analysis. Reading the summary or abstract can help to decide whether the material is relevant or not. (Cronin et al 2008.)

In the next phase the researcher reads the data again and makes sense of it. It includes reading the literature multiple times while taking more systematic and critical perspective at the same time. The research questions should be kept in mind while reading the literature. At the same time; the literature should be gone through while trying to find answer to the research questions. (Cronin et al 2008.)

Once the analyzer has read through the literature; he should be able to understand the material and be able to group it into categories based on the chosen structure of the review. In order for the results to be understood correctly; the categories should be clear and consistent. (Cronin et al 2008.)

In this thesis; three articles and two evidence-based books were read through multiple times by the author. While reading the literature; the author highlighted the relevant information found from the materials. The sources and references of the originals authors also helped to find more relevant evidence-based literature and articles. 5 more articles were found relevant and used in the thesis. The process of reading through multiple times and highlighting the important information was repeated.

The found information was then divided into categories based on the subject field. The generic- and subcategories were then found while processing the found information. These can be seen in table 2.

SUBCATEGORY	GENERIC CATEGORY	MAIN CATEGORY
Effects on the baby	Effects of smoking during pregnancy	Care of women smoking during pregnancy
Effects on the mother		
Support from nurse, partner, family and friends	Ways to support the mother to quit smoking	
Nicotine-replacement therapy		
The absorption of toxic substances into the body	The toxic substances of tobacco	
Different toxics of tobacco		
Effects of smoking on breastfeeding	Smoking and breastfeeding	

Table 2. An example of analysis process of this thesis by dividing the found information into categories.

9 Results

9.1 The toxic substances of tobacco

Nicotine contracts the blood vessels, and it also effects on the fetus' blood vessels. Thus; the blood supply of the fetus is disturbed by the lack of oxygen (Klementti & Hakulinen-Viitala 2013). Nicotine transfers into the placenta and the umbilical cord through the blood circulation; causing asphyxia. The fetus also has a weaker ability to eliminate the nicotine from its system compared to the mother. (Vierola 2006.)

Smoking cigarettes is the most common way of exposure to carbon monoxide, but it can also enter the body through the skin or by breathing it in through the lungs. Carbon monoxide mainly causes fetal death and damages to the brain of the developing fetus. However; a small study has shown that fetal death and brain damages are likelier to happen that when the carbon monoxide levels in the mother are high enough. Carbon monoxide also causes lower birth weight. Women who smoke have higher carbon monoxide levels in their blood, which reduces the oxygen in the blood. (MotherToBaby 2013.)

Cyanide, cadmium and lead are the main heavy metals of the tobacco smoke that disturbs the growth of the fetus (Vierola 2006). Cadmium increases the risk of early delivery; leading to lower birth weight. Cadmium can also be transferred into the baby after the birth through breast milk (Nishjiro et al 2001). The common effects of exposure to lead are miscarriage, stillbirth, lower birth weight and premature delivery. Lead can also cause leaning and behavioral problems. (MotherToBaby 2014.)

9.2 Adverse effects on the baby

Infants born to smoking women can be about 200 g smaller than infants born to non-smoking women. The risk is dependent on the amount of cigarettes smoked daily; the risk of fetal grown restriction is greater during the second and third se-

mester. Maternal age and genetic polymorphism are also possible factors leading to risk of low birth weight. Fetal hypoxemia, reduced blood flow across the placenta, and increased cadmium levels are also possible suggested mechanisms. (Einarson & Riordan 2009.)

According to Einarson and Riordan (2009), smoking during pregnancy has 2.0-3.0 relative risk of Sudden Infant Death Syndrome (SIDS), which is dose-dependent according to some studies. However; the increased risk of SIDS can be due to infant exposed to second-hand smoking rather than prenatal exposure. This can be explained by the fact that many women who smoke during their pregnancy continue smoking after the baby is born; thus exposing the child to tobacco smoke.

For women who smoke; the risk of miscarriage is 20-80 % greater than for non-smoking women. According to Einarson and Riordan (2009), the decreased levels of gonadotropin in smoking women is the possible factor leading to miscarriage. HUSLAB (2.6.2015), also presents that nicotine contracts the blood vessels and impairs the blood flow in the womb and placenta; thus disturbing the baby from getting oxygen.

Some studies suggest that smoking during pregnancy is associated with a small increased risk in oral clefts. A relative risk of 1.2-1.3 for cleft lip and/or palate (CL/P), and cleft palate only, show in meta-analyses, with genetic polymorphisms appearing to influence the risk. (Einarson & Riordan 2009.)

Klementti and Hakulinen-Viitanen (2013) also present that smoking during pregnancy can lead to infections of the respiratory track and asthma in later life. However; these are more likely due to the child being exposed to tobacco smoke after the birth. Also; childhood obesity and high blood pressure, compared to the children of non-smoking mothers, can be associated with being exposed to tobacco smoke.

Smoking during pregnancy can also lead to different behavioral problems in the future. Depending on the amount of cigarettes smoked daily; the child is likely to develop attention deficit hyperactivity disorder (ADHD). More typical effects of children of pregnant smokers are learning disorders and relatively low IQ. (Klementti & Hakulinen-Viitanen 2013.)

9.3 Effects on the mother

According to Einarson and Riordan (2009), the changes of becoming pregnant are decreased by the anti-estrogenic effects of smoking. These include anovulation, a shorter luteal phase and earlier menopausal age.

Some typical effects of smoking include irregular menstrual cycles, skipping of menstruation and irregular detaching of the ovum. The decrease in estrogen levels can also be one factor associated with infertility. According to doctors; quitting smoking is the basic care of a woman suffering from infertility. (Tupakkaklinikka 2.6.2015.)

Women who smoke also have the risk of preterm delivery, the risk ranging from 1.2 to 1.6; depending on the amount of cigarettes smoked daily. Very early preterm delivery (<32 week) has stronger association to maternal smoking than moderate preterm delivery. The possible mechanisms leading to preterm delivery can be preterm rupture of the membranes, intrauterine infection and increased production of prostaglandins. (Einarson & Riordan 2009.)

Smoking during pregnancy is also associated with increased risk of Pelvic Inflammatory Disease (PID), which is an important risk factor for ectopic pregnancy. Smoking is also associated with ectopic pregnancy, independent from PID. (Einarson & Riordan 2009.)

Generative and inflammatory alteration in the placenta, decreased plasma ascorbic acid levels, and premature rupture of the membranes are the suggested possible mechanisms for smoking leading to placental abruption. Placental enlargement, which enables the placenta to reach the cervical opening, can be caused by hypoxia; another suggested mechanism of smoking. (Einarson & Riordan 2009.)

Nicotine absorbs into the mother's milk, making the nicotine concentration five times higher to the concentration in the blood. Nicotine remains in the milk for even 3-5 hours after smoking. Smoking mothers are likely to quit breastfeeding earlier than non-smoking mothers. The baby can reject the milk, because the smell and taste of tobacco are transferred to the mother's milk. The mother's milk is also

less nutritious and has lesser concentration of the vitamin C. (Tupakkaklinikka 2.6.2015.)

9.4 Supporting the mother to quit smoking

According to Käypähoito (2012), a change of rehabilitation from smoking should always be offered by the health care personnel. Especially with women, whose smoking habits have significant effect on their baby, the education should be emphasized on what kind of health problems their child could have in the future.

When dealing with pregnant smoking women; it is important for the nurses to have caring, empathic and understanding attitude. Quitting from smoking can be successful when the mother is encouraged and advised on recognizing situations that could lead to smoking, and how to avoid relapse during those situations. (Käypähoito 2012.)

If the mother smokes more than 10 cigarettes a day, or otherwise can't quit smoking; nicotine-replacement therapy should be recommended. Nicotine-replacement therapy is always considered a better option for pregnant women than actual smoking (Tikkanen 2008, according to Tiitinen 2014). Short-acting products are recommended to be used in nicotine-replacement therapy. The mother should avoid smoking during nicotine-replacement therapy, because the combined use could increase the nicotine concentration. Nicotine-replacement therapy during pregnancy should always be done under the supervision of a doctor or a nurse. (Klementti & Hakulinen-Viitanen 2013.)

The woman's social support system should be involved in the care, because having a smoking partner is a risk factor for smoking cessation. The woman's chances of quitting smoking can be increased if the partner or other people in her social circle do not smoke and provide her with social support. The partner, family and friends can also choose not to smoke around her and support her efforts to quit, if they cannot stop smoking themselves. (Pregnets.Org 2012)

Sometimes the woman might be simply unable to quit smoking, even when she's pregnant. In those cases; the women should be encouraged to reduce smoking.

Even though there is no known safe level of smoking or in exposure to secondhand smoking; reducing smoking has more health benefits than not reducing smoking at all. Some methods of reducing smoking include stopping smoking for brief periods of time or during critical points of pregnancy, such as leading up to delivery. Other methods include engaging in other healthy behaviors, such as healthy eating and exercise, eliminating exposure to secondhand smoking. (Preg-nets.Org 2012)

If the amount of cigarettes is significantly reduced; the risk of lower birth weight of the baby is also reduced. A sustained reduction of cigarettes can also possibly lead to complete cessation in the future. The woman's nicotine dependency is lowered while her self-efficacy is increased. Reduction of smoking also provides a feasibly option for women who have trouble with quitting smoking. (Pregnets.Org 2012)

10 Discussion and conclusion

10.1 Ethical and authenticity consideration

This thesis was done as a literature review by a nursing student, with no third party participants taking part in the thesis process. The material for this thesis is gathered from scientific evidence-based books and articles. The material is then read through and critically evaluated to define its reliability and importance to the thesis. All the original authors of the original literature are mentioned in the text and listed in the bibliography.

Since the thesis doesn't include any original research, third party participants or questionnaires; there is no need to seek approval from ethics committee.

10.2 Reflecting the results

Smoking during pregnancy is a world-wide health issue among women. Smoking during pregnancy can cause many serious damages for the baby and the mother.

Low birth weight is one common effect of smoking during pregnancy. The risk of low birth weight is dependent on the amount of cigarettes smoked daily, and is greater during the second and third semester. Sudden Infant Death Syndrome (SIDS) can also be associated with smoking during pregnancy due to lower birth weight. The risk of miscarriage is also greater for smoking pregnant women. The risk of oral clefts, such as cleft lip and/or palate (CL/P) and cleft palate only, can also be associated with smoking during pregnancy.

The anti-estrogenic effects of smoking, such as anovulation, a shorter luteal phase and earlier menopausal age, decrease the woman's chances of becoming pregnant. Smoking during pregnancy also increases the risk of preterm delivery, and is dependent on the amount of cigarettes smoked daily. The increased risk of Pelvic Inflammatory Disease (PID), which also increases the risk of ectopic pregnancy, can also be associated with maternal smoking. Smoking during pregnancy can also be associated with placental abruption. Hypoxia, caused by smoking, can

cause placental enlargement which enables the placenta to reach the cervical opening.

Nurse's attitude has a significant effect in supporting the mother to quit smoking. Caring, empathic and understanding attitude encourages the mother effectively. The mother should also be taught to recognize situations that could lead to temptation to smoke, and how to avoid relapse in those situations. It is also important to educate the mother about the health problems their child could have in the future.

When the author was searching the literature for this thesis, she discovered certain challenges about the information she had found. While there was a lot of information about the effects smoking causes for the baby and the mother available; there was only little information about the nurse's role in mother's smoking cessation process. Even the nurses working at prenatal clinics didn't have any written information of their own about facing a pregnant woman who smokes, but they had to rely on the information they had been given at nursing school.

10.3 Conclusion

In summary; smoking during pregnancy causes many hazardous effects. The effects are mainly physical, and smoking affects both the baby and the mother. Some of the effects on the baby cannot be found until later in childhood. The findings in this thesis present that smoking during pregnancy causes lower birth weight, ectopic pregnancy, miscarriage and Sudden Infant Death Syndrome (SIDS). It also decreases the woman's ability to get pregnant and can cause placental abruption. Caring, empathic and understanding attitude of a nurse can encourage the mother to quit smoking. If the nurse expresses empathic attitude, adequate professional skills and presents the mother with accurate information about the effects of smoking on the baby; the rehabilitation from smoking is likelier to succeed.

10.4 Further suggestions

In the future; nurses should be educated to face pregnant smoking women already during their nursing studies, so that they will be able to provide the mother information about the effects smoking has on the baby, and what kind of attitude is required from the nurse.

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