



Use of E-cigarettes and Other Unconventional Nicotine-containing Products among Pregnant Women

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Abstract

Introduction: *Electronic cigarettes (e-cigarettes) are products that deliver an aerosol (commonly called steam) containing nicotine. The impact of e-cigarettes on human health has so far been studied mainly in healthy people after short-term exposure. Only minor side effects were revealed. Polish statistics on the prevalence of smoking among pregnant women indicate that around 15-30% of women smoke cigarettes during pregnancy. The data come from a few researches conducted in Poland. However, there is no assessment of the prevalence of e-cigarette use among pregnant women. It can be suspected that this could be a growing problem in this group. Foreign studies among pregnant women are still scarce. There are voices that the conviction about the safety of e-cigarettes can lead to their more frequent use during pregnancy.*

Aim: *The aim of the study was to assess the frequency of using e-cigarettes and other nicotine-containing tobacco products among pregnant women. Knowledge about their harmfulness was also examined.*

Material and methods: *A cross-sectional study was conducted among pregnant women receiving antenatal care at the Poviast Health Care Complex in Piotrków Trybunalski in 2018. The research tool was a questionnaire. The study design received a positive opinion of the Bioethics Committee at the Medical University of Lodz RNN/ 386/17/EC of December 19, 2017 and the consent of the head of this unit.*

Results: *600 pregnant women participated in the study, the response rate was 45.2%. About 15% of respondents thought that compared to traditional cigarettes, e-cigarettes are more harmful, 59.2% are just as harmful, and 25.8% are less harmful. Every fifth pregnant woman in the last 12 months was asked by the doctor about the use of e-cigarettes, 12.5% obtained advice to quit, 3.1% obtained to reduce the level of use of e-cigarettes, the doctor advised not to quit e-cigarettes 3,1% of respondents, and did not give any guidance to 31.3% women. Less than 2% of respondents thought that e-cigarettes are safe*

and can be used during pregnancy, 20.0% – e-cigarettes are less harmful than traditional cigarettes, and 79.3% – e-cigarettes can affect pregnancy as well as traditional cigarettes. Less than 12% of respondents said they had heard about smokeless electronic devices for heating tobacco (e.g. IQOS). However, 2.5% declared that they used the product at least once in their life.

Conclusions: *The use of e-cigarettes and other unconventional nicotine-containing products by pregnant women is a significant problem. Pregnant women should be educated about the possible negative health effects of using e-cigarettes.*

Key words: *e-cigarettes, unconventional nicotine containing products, pregnancy, nicotine*

Introduction

Electronic cigarettes (e-cigarettes) provide an aerosol (commonly referred to as steam) containing nicotine, formed by heating a solution, which usually consists of propylene glycol or glycerol (glycerin), nicotine and flavoring [1]. So far, the effects of e-cigarettes on human health have been studied, mainly in healthy people after short-term exposure. Only minor side effects were revealed. People with asthma and chronic obstructive pulmonary disease may be afraid of respiratory irritation and bronchospasm caused by the propylene glycol contained in the aerosol. There are no reports on the safety of using e-cigarettes in patients with known cardiovascular disease. Only a few studies directly check the health effects of exposure to e-cigarette aerosol. The effects of acute, short-term use of e-cigarettes were studied among people who were also smokers of traditional cigarettes [2,3]. Polish statistics on the prevalence of smoking among pregnant women indicate that around 15-30% of women smoke during pregnancy [4-7]. The data come from the few surveys conducted in Poland. However, there is no assessment of the prevalence of e-cigarettes in pregnant women. It can be suspected that this could be a growing problem in this group. Foreign studies among pregnant women are still scarce. Data from the US indicate that the number of e-cigarette users (6.5%) exceeded the number of those who smoke traditional cigarettes (5.6%) with a still significant percentage of so-called dual users, i.e. people using both products interchangeably (8.54%) [8]. There are voices that the conviction about the safety of e-cigarettes may lead to their more frequent use during pregnancy [9].

Material and methods

A cross-sectional study was conducted among pregnant women receiving antenatal care at the Poviats Health Care Complex in Piotrków Trybunalski in 2018. The respondents were recruited at the outpatient clinic of the Poviats Health Care Team in Piotrków Trybunalski. The study de-

sign received a positive opinion of the Bioethics Committee at the Medical University of Lodz RNN/386/17/EC of December 19, 2017 and the consent of the head of this unit. All women who agreed to participate in the study or for women under 18 years of age after obtaining the written consent of a parent or legal guardian were included in the study. The study was conducted from January 2018 to December 2018. The research tool was a questionnaire. The questions in the questionnaire relate to the following issues: sociodemographic data, smoking and use of e-cigarettes by both a pregnant woman and partner, smoking intentions, exposure to secondhand smoke. Smokers were also asked about a subjective assessment of quitting methods, motivators and barriers to smoking cessation. The research tool was previously used in Poland by Balwicki et al. [4,10].

Results

The study involved 600 pregnant women out of 1,326 patients from the Poviát Health Care Center in Piotrków Trybunalski in 2018. The response rate was 45.2%. The age of pregnant women included in the study is 19 to 41 years old. The average age was 26 years. The most numerous group were women aged 25-29. Most women were married (79%); 19.5% were single and 1.5% were widows or divorced. 21% of pregnant women had primary education, 25.5% vocational education, 38.5% secondary education and 14.5% higher education. Almost half of the respondents (45%) were pregnant for the first time. Most of the examined women (81%) were in the third trimester of pregnancy; 15.9% were in the second trimester and 2.0% were in the first trimester. Multifarines constituted over half of the pregnant women (55%). Professionally active women constituted 77% of the study group. The most common type of work declared by working respondents is mental work. The average monthly income per family member in most pregnant families (35.5%) ranged from 700 to 1000 per person in the family. Among 45.5% of respondents, the income per person in a household was so low that it is difficult (including with

great difficulty, difficulty, and some difficulty) to make ends meet. Over 85% of respondents rated their health as good or very good, 11.7% as neither good nor bad and 1.6% as bad or very bad (Table 1). Data obtained from questionnaire interviews indicate that 26.7% of respondents have ever used e-cigarettes, and 73.3% have never tried e-cigarettes (Table 2). 16 surveyed women used e-cigarettes during pregnancy (2.6% of all respondents). Users of e-cigarettes most often chose aerosols with lower nicotine concentrations containing 6 to 12 mg/ml of nicotine or none at all (6.2%). It was found that 23 women included in the study used them as a method of quitting smoking from traditional cigarettes, 15 used them alternately with traditional cigarettes (Table 2). Every fifth pregnant woman has been asked by the doctor in the last 12 months if she has used e-cigarettes, and 12.5% have been advised to quit smoking. In contrast, 3.1% were advised to reduce the level of e-cigarette use. The doctor advised not to quit e-cigarettes 3.1% of respondents, and did not give any instructions to 31.3% of women. Around 15% of respondents thought that compared to traditional cigarettes, e-cigarettes were more harmful, 59.2% thought they were just as harmful and 25.8% were less harmful (Table 3). Regarding the impact of e-cigarettes on pregnancies, nearly 2% expressed the opinion that e-cigarettes are safe and can be used during pregnancy, 20.0% thought that e-cigarettes are less harmful to the course and outcome of pregnancy than traditional cigarettes, and 79.3% thought that e-cigarettes could affect pregnancy as well as traditional cigarettes. Less than 12% of respondents said they had heard about smokeless electronic devices for heating tobacco (e.g. IQOS). On the other hand, 2.5% declared that they had already taken such a tobacco product at least once in their life. The vast majority do not use such products at all (Table 4).

Table 1. Characteristics of the study population (n=600)

Characteristic		N	%
Age in years			
	min-max	19-41	
	average	26	
	median	5,6	
	<19	10	1,7
	20-24	120	20,0
	25-29	243	40,5
	30-34	159	26,5
	35-39	65	10,8
	40-44	3	0,5
	45+	0	0,0
Week of pregnancy at the time of the study		\bar{x} 31,5; median 35,0 SD 9,5	
Trimester of pregnancy			
	I trimester	32	2,0
	II trimester	128	15,9
	III trimester	440	82,1
Education			
	basic	129	21,5
	professional	153	25,5
	average	231	38,5
	higher	87	14,5
Currently pregnancy			
	1	270	45,0
	2	210	35,0
	3	85	14,2
	4	20	3,3
	5	10	1,7
	6	5	0,8
Delivery			
	one delivery	270	45,0
	many deliveries	330	55,0
Number of deliveries			
	0	270	45,0
	1	245	40,8
	2	60	10,0
	3	15	2,5
	4	5	0,8
	5	5	0,8

Employment			
	employed	465	77,5
	unemployed	35	5,8
	other	90	15,0
	no answer	10	1,7
Type of work			
	physical work (predominance of physical effort)	180	38,7
	intellectual work (predominance of mental effort)	285	61,3
Marital status			
	married	474	79,0
	single	117	19,5
	widow / divorced	9	1,5
Living with a partner			
	Yes	562	93,7
	No	38	6,3
Subjective income assessment „makes ends meet”			
	with great difficulty	0	0,0
	with difficulty	25	4,2
	with some difficulty	248	41,3
	fairly easy	206	34,3
	easily	88	14,7
	very easy	33	5,5
Monthly income			
	up to PLN 500	20	3,3
	over 500 to 700 PLN	49	8,2
	over 700 to 1000 PLN	213	35,5
	over 1000 to 1500 PLN	188	31,3
	over 1500 to 2000 PLN	86	14,3
	over 2000 to 2500 PLN	17	2,8
	over 2500 PLN	27	4,5
Subjective assessment of healthy state			
	very good	245	40,8
	good	275	45,8
	neither good nor bad	70	11,7
	bad	5	0,8
	very bad	5	0,8

Family help and support			
	at all	30	5,0
	sometimes	110	18,3
	often	85	14,2
	always	375	62,5

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Table 2. Use of e-cigarettes among pregnant (N=600)

Answer	N	%
Have you ever taken an e-cigarette for once in your life?		
Yes	160	26,7
No	440	73,3
During the 3 months before you got pregnant, how often did you use your e-cigarette on average? 34 women 21.2% of those who used e-cigarettes used them every day		
	$\bar{x}=7,6$	sd=3,2
During the week (if less often than daily) 14 women 8.7% of those who used e-cigarettes used them less often every day		
	$\bar{x}=71,6$	sd=1,1
How often do you use an e-cigarette?		
Every day	16	10,0
Less often than every day	7	4,4
I do not use at all	137	85,6
How much nicotine do you have in your e-cigarettes? Applies to n=160		
Do not contain nicotine	10	6,2
6 mg/ml or less	15	9,4
12 mg/ml	15	9,4
18 mg/ml	0	0,0
24 mg/ml or more	0	0,0
No data	120	75,0
Which of the following best describes your situation?		
I use e-cigarettes as a way to stop smoking traditional cigarettes	23	15,6
I use alternating e-cigarettes with traditional cigarettes	15	9,4
I have always used only e-cigarettes	0	0,0
No data	120	75,0
If you have used or used an e-cigarette and smoked or smoked regular cigarettes, which one did you try first?		
Traditional cigarette	160	100,0
E-cigarette	0	0,0
Over the past 12 months, has your doctor asked you whether you smoke e-cigarettes?		
Yes	30	18,7
No	90	56,3
No data	40	25,0
What did the doctor advise?		

He advised to quit	20	12,5
Advised reducing the use of e-cigarettes	5	3,1
Advised not to quit	5	3,1
He gave no instructions	50	31,3
No data	80	50,0
In the last 12 months, have you received from the doctor or other medical staff professional advice on quitting smoking or educational materials on quitting smoking?		
Yes	5	3,1
No	105	65,6
No data	50	31,2
Does your husband / partner use e-cigarettes?		
Yes	122	20,3
No	478	79,7
Do your friends use e-cigarettes?		
None of them	130	21,7
Some of them	400	66,7
Most or all	70	11,7

Table 3. Pregnant women opinions about the harmfulness of using e-cigarettes (N=600)

Answer	N	%
Compared to traditional cigarettes, how harmful they are electronic cigarettes (e-cigarettes) in your opinion?		
E-cigarettes are more harmful than traditional cigarettes	90	15,0
E-cigarettes are just as harmful as traditional cigarettes	355	59,2
E-cigarettes are less harmful than traditional cigarettes	155	25,8
What is your opinion about the impact of e-cigarettes on pregnancy?		
E-cigarettes are safe and can be used during pregnancy	10	1,7
E-cigarettes are less harmful to the course and outcome of pregnancy than traditional cigarettes	120	20,0
E-cigarettes can affect pregnancy as well as traditional cigarettes	470	79,3

Table 4. Use by a pregnant smokeless electronic device for heating tobacco (N=600)

Answer	N	%
Have you heard of a smokeless electronic device for heating tobacco (eg IQOS)		
Yes	70	11,7
No	530	88,3
Have you used an IQOS product at least once in your life?		
Yes	15	2,5
No	585	97,5
How often do you use smokeless electronic device for heating tobacco today? / only for 15 women who have ever signed up for IQO		
Every day	5	33,3
Less often than every day	0	0,0
I do not use at all	10	66,7

Discussion

It should be emphasized that there are few studies describing the frequency of using e-cigarettes, especially by pregnant women. In a study by Nicholas et al. It was found that 5.62% (n=25) women smoked traditional cigarettes, 6.52% (n=29) used e-cigarettes, 8.54% (n=38) used both tobacco cigarettes and e-cigarettes, and 79.33% (n=353) did not use tobacco cigarettes or e-cigarettes. Of the users of e-cigarettes, 74.6% (n=50) reported the transition to e-cigarettes from tobacco cigarettes during pregnancy [11]. The Kantar Public report for the Chief Sanitary Inspectorate has been published on the use of e-cigarettes in the general population in Poland. According to data from this report, among smokers of traditional cigarettes, 5% of women used e-cigarettes. The desire to quit smoking was the most frequently cited reason for using e-cigarettes (54%) [12]. In a study by Mark et al. (2015), results showed that 45% of pregnant participants believed that e-cigarettes were less harmful than traditional cigarettes, and 43% thought that e-cigarettes were less harmful to their child's health [13]. Interestingly, in the analysis taking into account the status of „smoking” of e-cigarettes („smoking”, „never smoking”), differences appeared. Most e-cigarette users believe that e-cigarettes are less harmful than traditional cigarettes for themselves and for the child (78% and 68%, respectively). Conversely, less than half of women who have never used e-cigarettes said that e-cigarettes are less harmful than traditional cigarettes for themselves and for the child (31% and 31%, respectively). While the majority (61%) of respondents considered e-cigarettes to be addictive, 43% said that they do not know that e-cigarettes contain nicotine [13]. A qualitative study conducted in Houston, Texas by Kahr et al. (2015) assessed the perceived risk associated with e-cigarettes and smoking during pregnancy at three clinics in the Houston area. Study participants were actively involved in prenatal care Centering Pregnancy (CP). Kahr et al. found that pregnant women believed that e-cigarettes are generally a safer and healthier alternative to smoking traditional cigarettes [14]. However, study participants also

expressed the opinion that during pregnancy, e-cigarettes are not safe and potentially harmful to the fetus and probably as harmful as traditional cigarettes. Interestingly, a conflicting subtopic emerged in this study that suggested that using e-cigarettes in pregnancy is not as harmful as smoking traditional cigarettes when used as an aid to stop smoking. Although the participants had knowledge about how and where to buy e-cigarettes, they had less knowledge about the composition of the e-cigarette and the health consequences of its use. Baeza-Loya et al. conducted a cross-sectional study to assess the opinion on the safety of e-cigarettes compared to traditional cigarettes. Participants in the study were both women and men using and not using e-cigarettes and traditional cigarettes. The age ranges included 'young adults' and 'older adults'. The survey included questions about traditional tobacco cigarettes and e-cigarettes, in particular participants were asked about opinions about the harmfulness of traditional cigarettes and e-cigarettes for pregnant women. While almost 100% of respondents (in all age categories) indicated that traditional tobacco cigarettes are harmful to pregnant women, only 50-75% of participants indicated that e-cigarettes are harmful to pregnant women. These results suggest that although study participants saw potential harm in using e-cigarettes during pregnancy, they still considered e-cigarettes to be safer than traditional tobacco cigarettes [15]. England et al. conducted a study to assess the perception of newly formed tobacco products among pregnant women and women planning pregnancy. Questions were asked about the status of smoking, as well as opinions on the health effects of new tobacco products (such as e-cigarettes, snus, soluble products) and the use of nicotine replacement therapy (NRT) during pregnancy and in general. 31% of respondents were pregnant smokers, 26% were pregnant and quit smoking, and 42% were smokers planning pregnancy. Participants of the study expressed the opinion that nicotine-containing products are harmful during pregnancy, but they could not answer which product they think is the most harmful. While several women considered NRT or soluble drugs to be least harmful during pregnancy, most participants most often mentioned ENDS (electro-

nic nicotine delivery systems) or e-cigarettes as the least harmful [16]. In addition, Farquhar, Mark, Terplan, Chisolm have shown that there is a widespread belief that e-cigarettes are potentially safer than traditional cigarettes [17]. They conducted a case study of a 22-year-old single woman who participated in the perinatal treatment program. The patient said that she knew that e-cigarettes contain nicotine, but in her opinion the use of e-cigarettes during pregnancy was less harmful to her and her child's health. The patient also expressed her belief that e-cigarettes provided her child with less nicotine than traditional cigarettes. Ashford et al. conducted a study of women, including pregnant women. This study evaluated opinions about the health risks associated with the use of e-cigarettes. While 69% of participants perceived e-cigarettes as a moderate or minor health risk, 20% perceived products as not posing any health risk. In the assessment of the reasons why participants decided to use e-cigarettes, „less harmful (for others and for themselves)” was one of the four most frequently mentioned reasons [18]. Fallin et al. conducted a study to assess knowledge, attitudes and insights about the use of e-cigarettes among pregnant women (n=8) and after delivery (n=4). Knowledge on e-cigarettes, patterns of use and perception of e-cigarettes as beneficial/ harmful to health were examined. It was found that participants were convinced that e-cigarettes are less harmful than traditional cigarettes; one participant described e-cigarettes as „not as dangerous as regular cigarettes” and „cleaner option”. However, participants also revealed their ignorance of the health effects of using e-cigarettes regarding potential side effects and unknown product composition [19]. Mark et al. observed that three-quarters of pregnant respondents perceive e-cigarettes as a tool to help stop smoking. Interestingly, there were no differences between those using and not using e-cigarettes, and those who had previously quit smoking and those who had never tried to quit before [20]. Kahr et al. observed that pregnant women believe that e-cigarettes can be used as a tool to stop smoking traditional cigarettes. This point of view was particularly often expressed by current smokers [14]. Fallin et al. also observed that respondents believe that an e-cigarette can serve

as a smoking cessation device [19]. England et al. noted similar results in their study [16]. In a case study conducted by Farquhar, Mark, Terplan and Chisolm, it was found that the participant switched to the use of e-cigarettes during pregnancy to reduce the number of traditional cigarettes smoked per day [17].

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