



Pregnant women's knowledge of risk factors and prevention of dental caries

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Abstract

Introduction. Mothers play a key role in ensuring the oral health of their children, They should have wide knowledge of both the risk factors for dental caries and methods of its prevention. Research conducted in Poland to-date indicates that pregnant women have inadequate knowledge of dental caries.

Objective. The aim of the study was to assess, on the basis of a questionnaire survey, pregnant women's knowledge on the causes of dental caries and dental caries prophylaxis in relation to age, place of residence, education, trimester of pregnancy and having children.

Materials and method. The study group consisted of 106 pregnant women who completed an anonymous online questionnaire. Based on the obtained answers, their knowledge was assessed. Data were statistically analysed by Student's t-test, ANOVA and Spearman's rank correlation test, $p < 0.05$.

Results. The respondents knew the etiological factors of dental caries and the role of fluoride in the prevention of this disease. However, 56.2% of respondents indicated that the amount of toothpaste used in children was not in line with expert recommendations. 95.3% of women were aware of the need for dental consultation during pregnancy, but only half knew when the first visit to the dentist should take place. Pregnant women did not know what an early carious lesion looks like. Statistical analysis showed a positive correlation between the number of correct answers and already having children ($p = 0.016$, $r = 0.2305$).

Conclusions. The women surveyed had a satisfactory level of knowledge on the causes and prevention of dental caries in children, but the education of future mothers is still necessary. Those with offspring had higher awareness than with the first born.

Key words

pregnant women, caries risk factors, caries prevention, knowledge

INTRODUCTION

Dental caries is a non-communicable disease. It is believed to be biofilm-driven, modulated by diet and determined by several factors (biological, behavioural, psychosocial and environmental) [1]. Primary prevention of dental caries consists of modifying or eliminating risk factors, such as dental plaque and sugar consumption, and increasing protective factors, such as topical fluoride and dental varnish [2]. Secondary prevention consists of detecting carious lesions at an early stage before a cavity develops, which is only possible through regular dental check-ups [2].

Dental caries in children remains a substantial population health challenge. The Global Burden of Disease study [3] showed that in 2017 untreated tooth decay affected 532 million children. According to the American Academy of Pediatric Dentistry (AAPD), perinatal and infant oral health is the foundation on which preventive and dental care is based. Activities that promote oral health contribute to a better quality of life by reducing the risk of inflammation and

caries [4]. There are a number of risk factors that contribute to an increased risk of early childhood caries (ECC): socio-demographic, dietary, hygiene, bottle/breastfeeding, bacterial flora-related and other factors [5].

Dietary factors include the frequent consumption of products containing 'added sugars', such as fruit juices, drinks, sweetened dairy products, sweet baked goods, sweets, breakfast cereals and syrups. In infancy, the method of feeding (breast/bottle) and feeding on demand, also at night, have an additional influence. In older children a healthy diet is based on eating 5 meals a day with at least 2 hours between them. Fruit and vegetables should be given as snacks. Sweets should not be eaten as separate meals, but as the end of the main meal [4,6]. The consistency of foods should be firm in order to stimulate chewing and prevent food retention in the mouth.

Hygienic factors include starting oral hygiene too late, not cleaning teeth before bedtime, lack of parental supervision during hygienic activities, not using fluoride-enriched toothpastes. A significant problem is the licking of the comforter by the parent, which leads to parent-child bacterial transmission. Oral care of a child should begin in the first months of life. In order to keep the mouth clean and to get the child accustomed to handling it, parents should regularly clean the gums before bedtime from infancy onwards. Finger-rolled

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accessories, such as a piece of gauze, a cotton handkerchief, a rubber or silicone brush and a special microfibre thimble can be used [7]. Hygiene with a soft toothbrush should be introduced from the first deciduous tooth. It is recommended to brush teeth twice a day in the morning and in the evening for 2 minutes. The child should be taught the correct grip and oral manipulation of the toothbrush, but parents should brush the child's teeth until the age of 7–8 years. By the age of 10, however, they should monitor the quality of hygiene and improve cleaning after the child [7]. Peppermint fluoride toothpaste should be used in the amount and concentration adjusted to the child's age and caries risk, as defined by the Polish Dental Association. These recommendations include the use of a smear of fluoride toothpaste (1,000 ppm) from the eruption of the first deciduous tooth, and increasing the amount of toothpaste to the size of a pea grain when the child reaches the age of 3 years [8].

The prevention of caries in children should already start during pregnancy, this is called pre-prevention [9]. The organism of the future mother undergoes numerous changes that increase the risk of oral cavity diseases through decreased saliva pH, worse self-cleaning of the oral cavity, as well as increased inflammatory response and weakened immune mechanisms [9,10]. These changes are related to the endocrine, immune, gastrointestinal systems and dietary habits. Studies in recent years have shown a positive correlation between periodontitis during pregnancy and complications such as low birth weight, pre-eclampsia and gestational diabetes [10]. In addition, the elimination of carious lesions in the mother and other people around the child reduces the risk of transmission of carious bacteria. The first visit of a child to the dentist should take place between 6–12 months of age after the eruption of the first tooth. The frequency of subsequent visits depends on the caries risk assessment, but they should not be less frequent than every 3–6 months. This allows the child to adapt to dental procedures, and also increases the chances of early detection of carious changes and their effective management.

Mothers, as the main caregivers, have a key role in ensuring the general health and oral health of their child. Therefore, they should have a broad knowledge of both the risk factors for dental caries and ways to prevent them. The burden of promoting pro-health behaviour rests mainly on the dental surgery personnel (dentists, hygienists), but also on general practitioners, gynaecologists conducting pregnancies and midwives in birthing schools [11,12]. Cooperation between these specialists is therefore extremely important. Every pregnant woman should have at least one follow-up visit to the dentist, as prescribed by the obstetrician, which should be used not only for dental treatment but also as an opportunity to provide the mother-to-be with information on caries prevention for her offspring.

Previous studies conducted in Poland have indicated inadequate knowledge of pregnant women on dental caries [13–16]. In the National Monitoring of Oral Health and Its Determinants conducted some years ago, the percentage of pregnant women who were able to provide correct answers to questions on oral health was estimated at 40% [16]. However, in recent years, educational campaigns raising parents' awareness on the prevention of dental caries, such as 'Dzieciństwo bez próchnicy' [English: 'A caries-free childhood'] and 'Leczymy mleczaki' [English: 'We treat milky teeth'] have been conducted both nationwide and locally.

OBJECTIVE

The aim of this study was to assess, on the basis of a questionnaire survey, pregnant women's knowledge of the causes and prevention of dental caries in relation to age, place of residence, education, trimester of pregnancy and having children.

MATERIALS AND METHOD

The survey was conducted on a group of pregnant women in Poland. The study was approved by the local Bioethics Committee and conducted in accordance with the Declaration of Helsinki. The respondents completed an anonymous online questionnaire shared between May 2021 – February 2022 on three online groups of pregnant women on the Facebook social networking site. Completion of the questionnaire was equivalent to providing informed consent for participation in the study. The author's survey questionnaire was prepared based on similar tools available in the literature and tested in a pilot study on a group of 10 women. Analysis of the mothers' knowledge was based on questions concerning etiological factors and caries prevention, as well as the influence of the mother's oral health on child development. A total number of correct answers made it possible to determine the level of knowledge. Each question could be awarded 1 point; in the case of multiple-choice questions with several correct answers, 1 point was awarded for a full answer. The maximum number of points was 18. The results were statistically analysed using Statistica 13.3 software. Student's t-test, ANOVA and Spearman's rank correlation coefficient were used for statistical analysis. Statistical significance was assumed at $p=0.05$. The Shapiro-Wilk test was used to assess the distribution of variables.

RESULTS

The questionnaire was completed by 106 women. Participants' demographic data are presented in Table 1. The majority were under 30 years of age (56.6%). Most of the women were city

Table 1. Characteristics of women participating in the survey

Variable		N	%
Age	< 30 lat	60	56.6%
	> 30	46	43.4%
Place of residence	City	76	71.7%
	Rural	30	28.3%
Educational level	Secondary	38	35.8%
	Higher	68	64.2%
Pregnancy trimester	1	22	20.8%
	2	33	31.1%
	3	51	48.1%
Number of children	0	58	54.7%
	1	31	29.3%
	2	11	10.4%
	3	3	2.8%
	4	3	2.8%

dwellers (71.7%) and people with higher education (64.2%). At the time of participation in the study, most women were in the third trimester of pregnancy (48.1%), with smaller groups of women in the second trimester (31.1%) and first trimester (20.8%). More than half of the surveyed women (54.7%) did not have children, while 29.3% had 1 child, 10.4% – 2 children, 2.8% – 3 children, and 2.8% – 4 children.

Table 2 presents the distribution of respondents' answers to the questions used to assess their state of knowledge. As the first sign of dental caries, the respondents most frequently indicated a black spot on the tooth (54.7%), while the correct answer 'white spot' was indicated by 25.5% of the respondents. The vast majority of women (75.5%) knew the etiological factors of dental caries. Factors increasing the risk of dental caries in children were as follows: giving sweetened beverages to the child (92.5%), eating sweets (92.5%), the mother licking the dummy soother (67.9%), giving the child fruit juices between meals (69.8%), putting the child to sleep with a bottle (64.2%), giving the child sweet cereal with milk for breakfast (57.5%), the presence of dental caries in the mother (55.7%). 80.2% of the respondents were aware that the frequency of sweets consumption had a greater effect on caries risk than their quantity.

Awareness of the negative impact of poor condition of primary teeth on permanent teeth was declared by 83% of the respondents. Only half of the respondents were of the opinion that the first visit to the dentist should take place between 6–12 months of age, when the first tooth erupts. As many as 31.1% of the surveyed women stated that this should take place only when all primary teeth have erupted (approx. 2–3 years of age). The vast majority of the respondents (82.1%) were aware of the necessity to clean the oral cavity of the child before the first teeth appearing and chose the correct methods of care: cleaning the oral cavity with a clean, sterile piece of gauze rolled onto the index finger and moistened with boiled water (79.8%), or chamomile (34.8%), and the use of ready-made gauze intended for the oral hygiene of the newborn (52.8%). Almost one-quarter of them thought that it was enough to clean the child's teeth once a day (22.6%) or less frequently (0.9%). As many as 95.3% considered fluoride as an important ingredient in toothpaste for caries prevention. Slightly more than half of the respondents (55.2%) considered the correct amount of toothpaste in the period from the appearance of the first deciduous tooth was the size of a pea grain, and 43.8% of respondents indicated the correct use of a small amount

Table 2. Responses to questions assessing pregnant women's knowledge of risk factors for dental caries and preventive measures

Question		N	%
What do you think an initial carious lesion looks like?	Black spot on the tooth	58	54.7%
	White spot on the tooth	27	25.5%
	Carious cavity	12	11.3%
	Not sure	9	8.5%
What factors are necessary for the development of caries?	A diet rich in carbohydrates, bacteria	5	4.7%
	Bacteria only	5	4.7%
	A diet rich in carbohydrates, time, bacteria, susceptibility to caries	80	75.5%
	Dental plaque and the long time it stays on teeth	13	12.3%
	Susceptibility to caries and bacteria	3	2.8%
What do you think increases the risk of tooth decay in children?	Falling asleep with a bottle	68	64.2%
	Accumulating bacterial plaque in people close to the child	45	42.5%
	Giving your child water to drink	1	0.9%
	Giving children fruit juices to drink between meals	74	69.8%
	Giving the child sweetened beverages to drink	98	92.5%
	Licking the baby's soother by the mother	72	67.9%
	Frequent treatment of the child with syrups	44	41.5%
	Eating sweets	98	92.5%
	Giving your child sweet cereal with milk for breakfast	61	57.5%
	Chewing gum with xylitol after a meal	13	12.3%
	Vitamin D deficiency	43	40.6%
	Brushing with fluoride toothpaste	0	0%
	Mother having dental caries	59	55.7%
What is associated with higher caries risk in children and adults?	Frequency of consumption of sweets	85	80.2%
	Amount of sweets consumed	21	19.8%
Do you think that the condition of primary teeth has an impact on the condition of permanent teeth?	Yes, poor condition of primary teeth can have a negative impact on permanent teeth	88	83.0%
	There is no such correlation	8	7.5%
	Not sure	10	9.5%
At what age should a child's first visit to the dentist take place?	Between 6-12 months of age when the first tooth erupts	55	51.9%
	If pain occurs	1	0.9%
	When all primary teeth have erupted (around 2-3 years of age)	33	31.1%
	If something causes me concern	15	14.2%
	Not sure	2	1.9%

Question		N	%
Do you think that a child's mouth should be cleaned before the first teeth appear?	Yes	87	82.1%
	No	16	15.1%
	Not sure	3	2.8%
What do you consider to be the correct methods of care of a child's mouth?	Gum massage with a hard-bristled toothbrush	5	5.6%
	Cleaning the mouth with a clean/sterile piece of gauze rolled onto the index finger and moistened with boiled water	71	79.8%
	Cleaning the mouth with a clean/sterile piece of gauze rolled onto the index finger and moistened with camomile	31	34.8%
	Cleaning the mouth with a toothbrush and toothpaste	0	0%
	Use of ready-made swabs for oral hygiene of the newborn	47	52.8%
How often do you think a child's teeth should be brushed?	Occasionally	1	0.9%
	Once a day	24	22.6%
	At least twice a day	81	76.5%
Which toothpaste should be used for daily hygiene?	Age-appropriate fluoride pastes for children and adults	101	95.3%
	Fluoride-free toothpaste because it is harmful	5	4.7%
In your opinion, how much toothpaste should a child use from the appearance of the first deciduous tooth to the age of 3?	Size of a pea grain	58	55.3%
	Smear of toothpaste	46	43.8%
	2–3 cm	1	0.9%
	4–5 cm	0	0%
	Without paste	0	0%
What flavour of paste would you choose for your child?	Mint flavoured	42	40.0%
	Fruit flavoured	63	60.0%
Do you think that the condition of your mouth during pregnancy has an impact on the health of the foetus?	It does not have any impact	3	2.8%
	It has a minimal impact	23	21.7%
	It has a significant impact	67	63.2%
	Not sure	13	12.3%
Do you think that the presence of caries and inflammation in the mother's mouth increases the risk of the child developing caries?	It has no impact	13	12.2%
	Caries can be passed from mother to child through saliva	71	67.0%
	Not sure	22	20.8%
Do you think that a dental appointment during pregnancy is necessary?	Yes	101	95.3%
	No, oral health does not affect the foetus or the course of pregnancy	5	4.7%
How often do you think pregnant women should visit the dentist?	Every 3 months	70	66.0%
	Once during pregnancy	28	26.5%
	Only if she feels the need (pain/bleeding in the mouth)	8	7.5%
	Such visits are not advisable during pregnancy	0	0%
Which treatments during pregnancy are reimbursed by the National Health Fund?	Scaling of all teeth once every 6 months	67	65.7%
	Root canal treatment of all teeth including treatment of up to 3 canals in a tooth	44	43.1%
	Local anaesthesia	44	43.1%
	Composite restorations in upper and lower anterior teeth	38	37.3%
	Dental check-up with oral hygiene instructions and check-ups	67	65.7%
	Extraoral radiographs	18	17.6%
	Treatment of oral mucosal lesions	34	33.3%
	Amalgam restorations	31	30.4%
Please indicate the following true sentences about pits and fissure sealing.	Applies to deciduous teeth	57	54.3%
	Applies to permanent teeth	54	51.4%
	A varnish coating of all teeth	40	38.1%
	This is a fissure sealant filling of the molars	41	39.0%
	It is a form of caries prevention	89	84.8%
	Should only be performed if the child complains of a toothache	3	2.9%
	Sealing reduces the risk of caries	90	85.7%
	Sealing completely prevents the occurrence of caries	6	5.7%
	Carried out on 15-year-olds	8	7.6%
Carried out on 6–8-year-olds	47	44.8%	

of toothpaste. Fruit-flavoured toothpaste was preferred to mint-flavoured toothpaste for children.

More than half (63.2%) of the respondents indicated that the condition of the mother's oral cavity during pregnancy affects the health of the foetus. Most women (67%) were aware that caries can be transmitted from mother to child through saliva. The awareness of the need for dental consultation during pregnancy was high (95.3%); however, 7.5% of respondents felt that it was only necessary in emergencies. The women interviewed were not well informed about which treatments during pregnancy are reimbursed by the National Health Fund. They also had partial knowledge of pits and fissure sealing.

The surveyed women obtained an average of 10.08 ± 2.80 points for correct answers. Statistical analysis showed no correlation between the level of knowledge of pregnant women on risk factors and caries prevention in children measured by the number of points obtained and the mother's age, place of residence, education and pregnancy trimester. The only variable that influenced the higher number of correct answers was having other children (Tab. 3). This was confirmed by the Spearman rank correlation coefficient – there was a weak positive relationship between knowledge and having children ($p=0.016$; $r=0.2305$).

Table 3. Statistical analysis of factors affecting the knowledge of pregnant women

Variable		N	Mean points SD	p
Age	< 30 lat	59	9.83 ± 2.68	0.3111*
	> 30	43	10.21 ± 2.92	
Place of residence	City	30	10.36 ± 3.07	0.5033*
	Rural	76	9.96 ± 2.69	
Educational level	Secondary	38	9.39 ± 3.14	0.0607*
	Higher	68	10.45 ± 2.53	
Pregnancy trimester	1	22	10.18 ± 3.14	0.8564**
	2	33	9.84 ± 3.08	
	3	51	10.17 ± 2.48	
Having other children	No	58	9.48 ± 2.53	0.0157*
	Yes	48	10.79 ± 2.9	

Student's t-test, ** ANOVA test, $p < 0.05$

Figure 1 shows the sources from which expectant mothers obtained information on dental care. Information provided by the dentist and content from the Internet were given as the primary means.

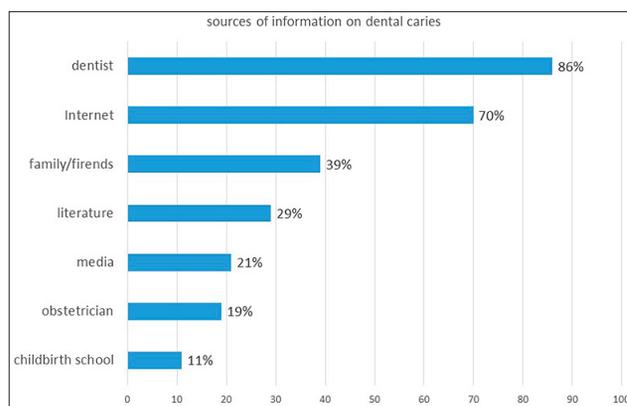


Figure 1. Sources from which the surveyed pregnant women obtained knowledge about dental caries

DISCUSSION

The study showed that the level of knowledge of the surveyed pregnant women on the reasons for caries in children and its prevention is satisfactory. In some aspects, the respondents showed better knowledge of this subject in comparison with the results of other Polish authors. Previous studies demonstrated a lower awareness of the possibility of mother-to-child transmission of carious bacteria [13,14], the right time to start hygienic procedures in the oral cavity of the child [15], the negative influence of caries of deciduous teeth on permanent dentition [13,16], the right time for the first visit to the dentist [13,15], and the time of introducing fluoride toothpaste [13,16].

This study confirmed the observations of other authors [13], that the age of a pregnant woman does not affect her level of knowledge on dental caries. The literature data indicate that it depends on the education and socio-economic status of the expectant mother [13,14]. In the current study, differences in the knowledge depending on the education of the subjects were on the threshold of statistical significance. The correlation between knowledge of dental caries and having offspring is consistent with the results of other authors [14,15].

Przeklasa et al. [14] showed that only 17.4% of pregnant women encountered an information campaign on oral health. For those who had children, the experience gained in the course of bringing them up translated into knowledge of the principles of preventing caries. This is facilitated by actions promoting oral health conducted in kindergartens and schools. That is why first-born mothers should be particularly targeted at dental education. According to Wapniarska et al. [15], two-thirds of parents-to-be would participate in training on the prevention of dental caries in children.

This study confirmed the observations of other authors [14,16] that dentists remain an important source of knowledge on oral health for pregnant women. However, it is worth noting that still not all pregnant women are aware of the need for regular dental visits during pregnancy. In the current study, the percentage was 4.5%, and 7.5% of respondents declared that a visit to the dentist's office is necessary only if there are worrying symptoms, such as pain or bleeding in the oral cavity. In the study by Przeklasa et al. [14], almost one-fifth of the respondents stated that dental visits were not necessary during pregnancy, and 8.3% of the women

believed that teeth should not be treated during pregnancy. Kobylińska et al. reported that two-thirds of pregnant women visited the dentist. The main reason for these visits was treatment needs [17].

Compared to the national survey conducted as part of the National Monitoring of Oral Health and Its Determinants, significantly more respondents indicated the Internet, 30% and 70%, respectively [16]. Due to wide access to the Internet, health education can be much simpler and can be conducted even in periods of limited access to specialists due to pandemic-related restrictions. However, some of the information available on the Internet (both on pregnancy and dental topics) may be of low reliability [18–21], and it is therefore very important to promote, also by obstetricians and midwives, reliable sources of knowledge developed by specialists in caries prevention (scientific societies, practitioners and dental hygienists).

Pregnant women are a group that has often been assessed in terms of oral health awareness. The presented study differs from previous studies due to the research tool used – an online questionnaire. The choice of such a tool was dictated by limitations related to the COVID-19 pandemic. The request to fill in the questionnaire was posted on forums gathering together pregnant women from all over Poland. The limitation is that only 106 women completed the form, which may indicate difficulties in obtaining data in this way. There was a high proportion of women living in cities and with higher education, who were probably more interested in oral health than other pregnant women.

The target group of the present study was pregnant women, but fathers/partners also play an important role in maintaining children's oral health. Their oral health literacy may be a factor contributing to the hygiene status and caries in children [22]. Research should be conducted on the knowledge of fathers-to-be.

CONCLUSIONS

The women surveyed showed a satisfactory level of knowledge about the causes and prevention of dental caries in children, but the education of expectant mothers is still needed. Those with offspring had higher awareness than first-time mothers. Due to the role of the Internet as a source of health knowledge, it is necessary to promote websites and other sites presenting verified information.

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