

Breast-Feeding and Smoking Habits among Israeli Women

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Key words: lactation, breast-feeding, cigarette smoking

Abstract

Background: Many women stop smoking before or during pregnancy, or while breast-feeding (nursing).

Objectives: To assess the relation between breast-feeding and smoking habits.

Methods: A survey was conducted among 920 women attending family health clinics (group 1) and a maternity department (group 2) on their breast-feeding and smoking habits.

Results: A total of 156 women (16.95%) smoked during pregnancy. A significant correlation was found between breast-feeding and not smoking after delivery ($P=0.009$ in group 1, $P=0.03$ in group 2). A higher tendency to nurse was found among women with an uneventful pregnancy, who vaginally delivered a singleton at term weighing 2,500–4000 g, and who received guidance on breast-feeding.

Conclusion: Professional guidance in favor of breast-feeding is crucial to increase the rate of nursing. Encouraging breast-feeding will probably decrease the rate of cigarette smoking.

IMAJ 2001;3:739–742

Cigarette smoking during pregnancy may affect not only the mother but also the infant. Smoking causes low birth weight [1–3] and leads to a higher rate of morbidity and mortality, probably due to the nicotine and its main metabolite cotinine that readily cross the placenta [4–6]. This is true also for passive smokers [7].

Cigarette smoking during lactation was found to be associated with infantile apneic episodes, hyperexcitability, vomiting and colic [8]. Furthermore, several studies found a good correlation between the nicotine content of the milk and the psychomotor development and health of the infant [9].

A breast-fed infant whose mother smokes is exposed to smoke as a passive smoker, through his respiratory system and by absorption through the gastrointestinal tract of nicotine present in the milk. This process depends on the number of cigarettes smoked by the mother, the interval between smoking and lactation, the level of nicotine in the milk, and the amount of nicotine absorbed through the gastrointestinal tract.

Schulte-Hobein et al. [10], comparing infants of smoking mothers with those of non-smokers, found that the excretion of cotinine in the urine of breast-fed-only infants of smoking

mothers was ten times higher than in formula-fed infants of smoking mothers, and three times higher than in both breast- and formula-fed infants of non-smoking mothers. These researchers found a direct correlation between the number of cigarettes smoked by the mothers and the level of cotinine in the infants' urine.

Many women stop smoking before or during pregnancy, while others do so during lactation [11,12]. Some of the women who stop smoking during pregnancy do not resume the habit, while others do [13,14]. We hypothesize that nursing women do not restart smoking as compared to non-lactating women. The purpose of this study was to determine whether or not a correlation exists between lactation and smoking habits.

Patients and Methods

The study was approved by the ethics committee of Assaf Harofeh Medical Center. The 920 women who participated in the study were recruited from two sources: family health clinics and a hospital maternity unit. At the former – 10 clinics in two large cities in the center of Israel where children are followed routinely and receive vaccinations – 494 mothers (53.7%) were enrolled. Only mothers of infants aged 12 months or less participated in the study. The second group comprised 426 mothers (46.3%) who gave birth at Assaf Harofeh Medical Center. These women were hospitalized for the routine period after delivery and were approached by us from a few hours to 5 days after delivery.

Personal interviews were conducted with each of the 920 women by means of a specific questionnaire on demographic variables, smoking habits and lactation experience. Lactation was defined as breast-feeding for at least 1 week, with or without formula supplements.

The women from the family health clinic reported whether they smoke, whether they breast-fed and for how long. The women interviewed in the maternity department declared their intention regarding breast-feeding and smoking. This declaration was not tested or verified later. In order to validate the answers about smoking, women at the family health clinic were randomly asked by the interviewer to give a urine sample after completion of the interview for nicotine and cotinine measurement. Twenty-two women gave urine for examination; 16 were non-smokers and 6 were smokers according to their self-report. Urinary nicotine and cotinine were measured by radioimmuno-

assay as described by Langone et al. [15]. The laboratory technician was blinded to whether the urine was from a smoker or non-smoker.

Data analysis

Continuous data (mother's age, infants' birth weight, presence of smoking and lactation) were evaluated by Student's *t*-test as mean \pm SD. Categorical data (the result of the pregnancy) were compared by chi-square analysis, as was the comparison between lactation and smoking.

Results

A total of 920 women aged 30 ± 5 years (mean \pm SD, range 17–47) participated in the study [Table 1]. Of these, 426 (46.3%) were interviewed in the maternity department and 494 (53.7%) in the family health clinics. The infants in the family health clinics were aged 5 ± 3.6 months (range 1 week to 1 year). Women were divided into two groups according to the place of interview. There was no significant difference between women in both groups with regard to marital status ($P = 0.68$), status of the last pregnancy ($P = 0.5$), duration of the last pregnancy ($P = 0.3$), mode of delivery ($P = 0.82$), number of infants born ($P = 0.06$) and baby's birth weight ($P = 0.61$).

In the family health clinics [Table 2], 263 women breast-fed (53.2%) for a duration of 3.2 ± 2.1 months (range 0.25–11 months). A significant correlation was found between breast-

feeding and uneventful pregnancy ($P = 0.0005$), vaginal delivery ($P = 0.0003$), at-term delivery ($P < 0.0001$), singleton birth ($P = 0.005$), birth weight 2,500–4,000 g ($P = 0.003$), and women who nursed at least half of their previous children ($P < 0.0001$) and for more than 1 month ($P = 0.002$) [Table 2].

At the maternity department, 330 women (77.4%) declared their intention to breast-feed. Some of them had already started nursing. These women were not approached later to confirm this intention. Instruction, help and guidance for lactation by a professional member of the maternity department correlated with the mothers' decision to nurse ($P = 0.0136$).

Of the 920 women, 168 (18.3%) had smoked 12 ± 10 cigarettes a day (range 1–60) for 8 ± 4.5 years (range 1–22). Twelve of them stopped smoking long before the pregnancy,

Table 2. Correlation between lactation and different factors in women from family health clinics (Group 1)

	Did not nurse (%)	Nursed (%)	P
Status of pregnancy			
Normal	188 (43.7)	242 (56.3)	0.0005
Problematic	43 (67.2)	21 (32.8)	
Rate of previous lactation			
0%	77 (81.9)	17 (18.1)	
1–50%	20 (62.5)	12 (37.5)	0.0001
>50%	51 (27.1)	137 (72.9)	
Average duration of previous lactation (mo)			
≤ 1	26 (50)	26 (50)	
1.1–2	15 (35.7)	27 (64.3)	
2.1–3	16 (37.2)	27 (62.8)	0.0017
3.1–6	9 (18)	41 (82)	
>6	5 (15.2)	28 (84.8)	
Duration of pregnancy (wk)			
36	30 (83.3)	6 (16.7)	0.0001
37	201 (43.9)	257 (56.1)	
Mode of delivery:			
Vaginal	182 (43.3)	238 (56.7)	0.0003
Cesarean section	49 (66.2)	25 (33.8)	
No. of babies:			
One	218 (45.6)	260 (54.4)	0.0049
More than one	13 (81.3)	3 (18.8)	
Birth weight (g)			
1,000–2,500	38 (66.7)	19 (33.3)	
2,501–4,000	176 (43.5)	229 (56.5)	0.0034
>4,001	17 (53.1)	15 (46.9)	
No. of children			
1	82 (45.8)	97 (54.2)	
2	67 (45.9)	79 (54.1)	NS
3	60 (48.8)	63 (51.2)	
>4	22 (47.8)	24 (54.2)	

NS = not significant

Table 1. Patient characteristics (total number 920)

	Group I* N (%)	Group 2** N (%)	P
Marital status			
Married	488 (98.8)	422 (99.1)	0.68
Widowed/divorced/single	6 (1.2)	4 (0.9)	
Status of pregnancy			
Normal	430 (87)	377 (88.5)	0.5
Problematic	64 (13)	49 (11.5)	
Duration of pregnancy			
37–42 wk	458 (92.7)	387 (90.8)	0.3
28–36 wk	36 (7.3)	39 (9.2)	
Mode of delivery			
Vaginal	420 (85)	360 (84.5)	0.82
Cesarean section	74 (15)	66 (15.5)	
No. of babies			
Singleton	478 (96.8)	420 (98.6)	0.06
Twins/triplets	16 (3.2)	6 (1.4)	
Birth weight (g)			
SGA	57 (11.5)	41 (96)	0.61
AGA	405 (82)	359 (84.3)	
LGA	53 (55.2)	26 (6.1)	

* Women from family health clinics

** Women from maternity department

SGA = small for gestational age, AGA = appropriate for gestational age, LGA = large for gestational age.

Table 3. Socioeconomic background of women who did and did not smoke before pregnancy

	Smoked before last delivery (n=156)	Never smoked (n=752)	P
Age (yr)	30.09 ± 5.2 (18–47)	29.86 ± 5.13 (17–45)	NS
Family status			
Widowed	0	1	
Divorced	2	0	$\chi^2=19.83$
Single	5	2	$P=0.0001$
Married	149	749	
No. of children	2 ± 1 (1–5)	2 ± 1 (1–5)	NS
Religion			
Christian	2	5	
Muslim	3	31	$\chi^2=0.75$
Jewish	151	716	
Origin			
Ashkenazi	69	401	
Sephardi	74	249	$\chi^2=13.05$
Mixed	9	54	$P=0.0045$
Israeli Arabs	2	33	
Health condition			
Healthy	149	734	$\chi^2=2.11$
Not healthy	7	18	$P=0.146$

unrelated to the pregnancy, and they were excluded. Thus, the smoking group included 156 women, of whom 77 were interviewed in the family health clinic (group 1) (49.4%) and 79 (50.6%) in the maternity department (group 2).

The socioeconomic background of the smoking women and non-smoking women was compared [Table 3]. No significant differences were observed between the smoking and non-smoking women, except for marital status ($P < 0.0001$) and origin ($P = 0.0045$) [Table 3]. Each group (family health clinic and maternity department) was further divided according to the presence or absence of smoking and nursing [Table 4].

There was a significant correlation between nursing and not smoking among women from the family health clinic [$P = 0.009$; relative risk 3.12 (1.23–7.9)] [Table 4]. Similarly, a significant correlation was found between intention to nurse and intention to stop smoking among women from the maternity department. [$P = 0.03$; relative risk 1.83 (range 0.94–3.57)] [Table 4].

Urinary nicotine level was $1,136 \pm 818$ ng/mg creatinine (range 393–2,374) among the smokers, as compared to 9 ± 4 (range 1.8–18) among the non-smokers ($P = 0.0001$). Urinary cotinine level was $2,656 \pm 1,319$ ng/mg creatinine (range 1,657–5,075) among the smoking women vs. 36 ± 40 (range 0–122) among the non-smoking women ($P = 0.0001$). These values of urinary nicotine and cotinine are as described elsewhere for smokers and non-smokers [16]. The nicotine and cotinine found

Table 4. Correlation between lactation and smoking**[A] Family health clinic (n = 77)**

Nursing	Stopped smoking	Did not stop smoking	Total
Yes	13	22	35
No	5	37	42

$\chi^2 = 6.7$

$P = 0.0096$

Relative risk = 3.12 (1.23–7.9)

[B] Maternity department (n = 79)

Intention to nurse	Intention to stop smoking	No intention to stop smoking	Total
Yes	40	22	62
No	6	11	17

$\chi^2 = 4.62$

$P = 0.03$

Relative risk = 1.83 (0.94–3.57)

in the urine of non-smokers are attributed to nicotine present in food and to passive smoking.

Discussion

Lactation

Several studies have been conducted on the frequency of breast-feeding in Israel [17–20]. We found that 53% of women do nurse, which is similar to the percentage reported for North America, 55.9% [21].

Appropriate guidance and maternal support at the maternity department may strongly affect the decision to nurse. If a woman is encouraged to nurse and for a prolonged period, the chances for the subsequent baby to be breast-fed are significantly higher ($P = 0.0017$). Therefore, appropriate educational programs, together with maternal support for encouraging breast-feeding, whether in the maternity department or in the community, should be planned.

Smoking and lactation

The rate of smoking among women in Israel in 1996 was 25%. This rate, however, refers to women of all ages. In our study we examined the rate of smoking among women at childbearing age, which was 18%.

In their study, Little et al. [22] observed a significant reduction in smoking during pregnancy, which rose again in the 3 months after delivery though not to the levels reported before conception. Several studies noted that smoking mothers wean their babies earlier than non-smokers [3,23]. Schwartz-Bickenbach et al. [3] found that among the women who expressed their wish to breast-feed, 50% of the smokers and 30% of the non-smokers stopped nursing after 4 weeks. After 6 months, only 19% of the smokers and 30% of the non-smokers were still lactating. The reasons they gave for stopping to nurse were uncertainty regarding the harm that smoking can cause and fear of not having enough milk.

In our study, there was a clear correlation among the 156

women who smoked until delivery between breast-feeding and not smoking after delivery. This was seen in both groups – maternity department and family health clinic. The relative risk in these groups was high, indicating that breast-feeding has an influence on the decision not to smoke. The intention to nurse and smoke as declared by the women at the maternity department was not verified later, which is a limitation of the study. However, we can assume that the outcome will resemble that of the women in the family health clinic group since the two populations were similar in terms of marital status, status of pregnancy, duration of pregnancy, mode of delivery, number of babies and birth weight.

As mentioned earlier, smoking women tended to wean their infants earlier (after 6–32 weeks, average 15 weeks) than non-smokers (9–39 weeks, average 22 weeks) [24]. Among mothers who nursed in our study, the smokers breast-fed for a shorter time than the non-smoking mothers (2.2 ± 1.3 and 2.8 ± 2.1 months, respectively; $P = 0.0072$). These data correspond to the findings mentioned above. Furthermore, we found a significant correlation between breast-feeding and not smoking after delivery ($P=0.03$). This strongly suggests that encouraging breast-feeding will probably decrease the rate of cigarette smoking among nursing women. It is well known that the longer the period of non-smoking, the lower the rate of restarted smoking [25]. Thus, if a smoking woman is encouraged to breast-feed, and for a longer period, she will hopefully stop smoking.

In conclusion, together with other factors, professional support and guidance in favor of breast-feeding in the maternity department is an important component in increasing the rate of nursing. In addition, educational programs supporting pregnant and lactating women to stop smoking will increase the breast-feeding rate, and at the same time decrease the rate of cigarette smoking.

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