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Is Smoking Intervention in General Practice More Successful Among Pregnant Than Non-pregnant Women?

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The objective of this study was to evaluate the effect of a simple smoking intervention programme, carried out by a large number of general practitioners (GPs) among pregnant and non-pregnant women. Four groups of women were defined by the dichotomies pregnant versus non-pregnant and intervention versus control. The intervention was semistructured, using a flip-over and a booklet, and it was implemented in an ordinary sequence of consultations. The study involved 187 GPs in western Norway. The subjects were 350 daily smoking pregnant women and 274 daily smoking non-pregnant women, 18–34 years of age. The point prevalence abstinence rate at 18 months was 15 and 20% for pregnant and non-pregnant women, respectively, in the intervention groups, and 7% in the control groups ($P_{pregnant} = 0.06$, $P_{non\text{-}pregnant} = 0.006$). Twenty-five per cent of the pregnant women and 34% of the non-pregnant women reported that they had reduced their cigarette consumption, but had not stopped smoking entirely. If we include all drop-outs as smokers, the continuous abstinence rate during 15 months was 6%/0% among pregnant women (intervention/control) and 5%/1% among non-pregnant women. Stopping smoking was associated with having a non-smoking partner ($P = 0.001$), and being encouraged to do so by their partner ($P = 0.004$). The prevalence of both pregnant and non-pregnant women who stopped smoking was higher in the intervention than in the control groups. Pregnant women stopped smoking as frequently as non-pregnant individuals. However, concerning mean daily cigarette consumption, a positive effect of the intervention was only observed for the non-pregnant women. There is a potential for more women to become non-smokers during the periods of pregnancy and child infancy. GPs should receive more training in this specific health promotion effort. More effective, low cost smoking intervention programmes, designed for pregnant women should be explored.

INTRODUCTION

Eighty-nine per cent of all Norwegian women become pregnant at least once during their lifetime.[1] They consult a general practitioner (GP), a gynaecologist or a midwife on an average of 11 times during their pregnancy. A majority of women use their GPs for most medical check-ups during pregnancy. Women as a group never have more frequent contact with the health care system than during the pregnancy.

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In 1987, 16% of daily smoking Norwegian women stopped smoking on their own when they became aware that they were pregnant.[2] Thirty-nine per cent were daily smokers when they consulted their GP for the first medical check-up.[2]

A successful smoking intervention programme designed for pregnant women can result in five important consequences for public health:[3,4]

1. reduce the risk of antenatal and perinatal complications;
2. reduce the health consequences of passive smoking among children;
3. reduce the future chance of tobacco-related diseases among women;

4. increase the smoking cessation rate among the male partners; and
5. if parents become non-smokers, this will reduce the chance of teenagers becoming smokers.

Smoking intervention studies in general practice have usually been designed so that a rather small number of GPs have participated.[5–8] In general, specially selected GPs may be more interested in and familiar with patient education and counselling. Thus the results of such studies may be too optimistic. In order to warrant the external validity of smoking intervention studies in general practice, a broader representation of participating GPs is preferable.

The aim of this study was to evaluate to what extent a simple intervention programme in general practice among daily smoking, pregnant and non-pregnant women results in smoking abstinence or a reduction in daily cigarette consumption 18 months later.

MATERIALS AND METHODS

We designed this study in order to assure that smoking intervention was: (i) implemented in an ordinary sequence of consultations in general practice; (ii) simple and realistic with regard to time consumption in general practice; and (iii) carried out by a large number of GPs not particularly selected or trained for this study.

All 398 GPs in western Norway (working half-time or more in general practice) were invited by mail to participate in the study.[9] Each GP was asked to record all pregnant women who consulted them during 12 months and to recruit, if possible, four pregnant and four non-pregnant women for the study.

A total of 187 GPs participated in the recruitment, which started in November 1986 and lasted for 1 year. Each participating woman was followed for 18 months. The follow-up ended in April 1989.

Through randomly allocating the GPs into subgroups, one-third of both the pregnant and non-pregnant patients ended up in the control groups and two-thirds in the intervention groups. The GPs who recruited pregnant women for the intervention groups recruited non-pregnant women for the control groups and vice versa.

Originally the study was planned to contain two different intervention groups among pregnant as well as non-pregnant women. The idea was to mobilize the social support of their partners in order to increase the effect of the intervention. However, during the study we realized that the partners were not sufficiently motivated to attend consultations. It was therefore decided not to distinguish between the two intervention conditions during analysis of the data and presentation of the results.

All the participating women were 18–34 years of age and daily smokers. They lived with a partner and there were no indications of serious social or medical problems at inclusion. The participation in the study was voluntary and the women could drop out at any time.

Daily-smoking pregnant women who consulted their GP for the first check-up in the first trimester of pregnancy were included. They were recruited among 2379 pregnant women who had their first medical check-up by the participating GPs during the recruitment period.[2] They had smoked at least five cigarettes per day during the last 3 months before pregnancy and they still smoked at least one cigarette per day at the first check-up.

Six-hundred and seventy-four pregnant women fulfilled the inclusion criteria. One-hundred and forty-four women refused to participate in the study. Among the remaining 530, 180 dropped out during the study period because they had spontaneous abortions (24), serious complications (8), moved to another district (31), or dropped out for other or unknown reasons (117). Hence, 350 pregnant women (98 in the control group and 252 in the intervention group) completed the study.

Daily-smoking, non-pregnant women were recruited when they consulted their GPs for complaints not related to smoking. They had smoked at least five cigarettes per day during the last 3 months. They did not plan to get pregnant within the next 18 months.

Four-hundred and thirty-seven non-pregnant women were included. We lack information about how many non-pregnant women refused to participate. During the study period 163 non-pregnant women dropped out, either because they got pregnant (25), moved to another district (23) or dropped out for other or unknown reasons (115), leaving 274 (111 in the control group and 163 in the intervention group) who completed the study.

At the first consultation, women in the intervention groups were advised to stop smoking. The communication lasted for not more than 15 minutes (usually 5 minutes). The GP's message was designed to provide information about the health hazards of smoking, how to stop smoking and how to avoid relapse. In addition, pregnant women were given special information about problems related to 'the smoking fetus'.

A flip-over (five pages) and a booklet (eight pages) were specially prepared for the pregnant women in the intervention group. An equivalent set was prepared for the non-pregnant women. At the end of the first consultation the flip-over was presented and the booklet distributed. The women in the intervention groups were invited to consult their GPs after 1, 6, 12 and 18 months to discuss their smoking habits and problems related to smoking cessation or smoking relapse.

Pregnant women in the control group followed an ordinary control programme during pregnancy and also in the first year after delivery. No extra consultations were organized for pregnant and non-pregnant women in the control groups and no flip-overs and booklets were distributed.

At inclusion, all patients were asked to fill in a questionnaire concerning their smoking habits, smoking history, smoking habits of significant others and attitudes to smoking cessation.

A blood test for the analysis of serum thiocyanate was taken at the first consultation and 12 months later. The serum analyses were performed at the Department of Clinical Chemistry, Ullevaal University Hospital, Oslo. Blood tests were not taken for the non-pregnant women in the control group, because such a blood test could represent a form of intervention.

Eighteen months after inclusion, the participating women received a postal, non-anonymous questionnaire. This questionnaire repeated some of the questions from the first one. In addition, the women were asked about their smoking habits during the study period.

At the end of the study, an anonymous questionnaire was sent to all the GPs who had participated in the study.[9] The GPs were, among other questions, asked about their age, sex, smoking habits and mean number of consultations per day.

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS/PC$^+$, version 4.0). The following methods were applied: two-way cross tabulation with χ-square test for independence, one-way analysis of variance, Student's *t*-test and multivariate analysis of variance with repeated measurements (MANOVA). Significance was accepted at the 5% level ($P < 0.05$).

RESULTS

If we take into account all pregnant women who were included in the study and assume that none of the drop-outs stopped smoking, one can calculate that 10% of pregnant women in the intervention group and 5% in the control group stopped smoking. If we make the same assumption regarding the non-pregnant women, 12 and 6% stopped smoking respectively.

The smoking cessation rate can also be calculated as the continuous abstinence rate. Here, only the women who reported that they had been non-smokers for 15 months of the study period are regarded as ex-smokers. If we use these conditions and include drop-outs, the continuous abstinence rate among pregnant women was 6%/0% (intervention/control) and among non-pregnant women 5%/1%. Among pregnant ex-smokers, the mean value of serum thiocyanate fell from 68.9 to 45.3 μmol/l and among non-pregnant ex-smokers from 80.0 to 35.1 μmol/l.

At inclusion there was no significant difference between the participants and the drop-outs with regard to mean daily cigarette consumption, age, attitudes towards own smoking habits, age of starting smoking and smoking habits of the partner. Only the participants will be considered in this presentation and their characteristics are presented in Table 1.

A total of 350 pregnant women and 274 non-pregnant women went through the whole study. This represents 66% of the original 530 pregnant women and 63% of the original 437 non-pregnant women. More women in the intervention groups than in the control groups reported that they had stopped smoking. The point prevalence abstinence rate is shown in Table 2.

Possible predictors at inclusion of being an ex-smoker 18 months later were examined (Table 3). Pregnant women who had stopped smoking 18 months after inclusion reported nearly the same cigarette consumption at inclusion as pregnant women who did not stop smoking. However, those who stopped smoking during the study had a significant lower mean value of serum thiocyanate at inclusion than those who did not stop smoking ($P = 0.002$). Among the pregnant women, stopping smoking was associated with being older ($P = 0.03$), having a non-smoking partner ($P = 0.004$), being encouraged to stop smoking by their partner ($P = 0.02$) and being older when they started smoking ($P = 0.02$) compared with pregnant women who did not stop smoking. The same associations, but to a lesser extent, were found among non-pregnant women (Table 3).

Figure 1 shows the mean daily cigarette consumption over time for the four groups of women defined by the dichotomies pregnant versus non-pregnant and intervention versus control. The change in cigarette consumption among pregnant women was significantly different from non-pregnant women ($P < 0.001$). The pregnant women reduced their consumption during the first 6 months (until delivery), and increased their consumption during the next 12 months. Among non-pregnant women in the intervention group, the mean daily cigarette consumption was reduced by 30% during the study period, while it remained stable in the control group. An overall difference in trends between intervention and non-intervention was also found ($P < 0.05$). However, a positive 'effect' of the intervention was observed among the non-pregnant women only ($P < 0.001$).

Twenty-five per cent of pregnant women who did not stop smoking reported that they had reduced their cigarette consumption at the end of the study. Fifty-three per cent had increased their consumption. Among non-pregnant women who did not stop smoking, 34% reported a reduction in cigarette consumption and 29% an increase.

Among the 187 GPs who participated in the study, 178 (88%) answered the questionnaire (33 female and 145 male). Sixteen per cent reported that they were smokers (6% daily smokers and 10% now and then). At inclusion, there was no relation between the smoking habits of the GPs and the cigarette consumption of the patients in the study. Twelve months later, pregnant women whose GPs were smokers, reported a higher daily cigarette consumption than women who attended non-smoking GPs (9.2 versus 7.5 cigarettes per day, $P = 0.02$). An equivalent trend was found by analysis of serum thiocyanate of pregnant women

TABLE 1 *Characteristics of the participating pregnant and non-pregnant women registered at inclusion*

Characteristics registered at inclusion	Pregnant women n = 350 (95% CI)	Non-pregnant women n = 274 (95% CI)	Significance P value
Mean age of the women (years)	25.9 (25.4–26.3)	27.6 (27.1–28.2)	0.001
Mean age of starting smoking (years)	16.0 (15.8–16.3)	16.2 (15.9–16.5)	0.3
Mean number of cigarettes smoked per day	9.5 (9.0–10.1)	13.4 (12.6–14.2)	0.001
Mean values of serum thiocyanate (μmol/l)	83.0 (80.0–86.0)	99.2* (93.9–104.5)	0.001
Prediction of being a non-smoker within 5 years (%)	57	57	0.9
Percentage answering that their smoking 'is a big problem'	47.7	44.5	0.2
Percentage of partners smoking daily	69.3	71.7	0.5
Percentage encouraged by partner to stop smoking	57.7	42.1	0.001

* Analyses of serum thiocyanate were not performed among non-pregnant women in the control group.

TABLE 2 *Point prevalence abstinence rate (%) 6, 12, 15 and 18 months after inclusion*

	n	6 months	12 months	15 months	18 months
Pregnant					
Intervention	244	19	16	15	15
Control	97	8	11	10	7
P value		0.02	0.3	0.3	0.06
Non-pregnant					
Intervention	154	16	17	19	20
Control	109	4	11	7	7
P value		0.002	0.2	0.008	0.006

Missing data from nine pregnant and 11 non-pregnant women.

TABLE 3 *Smoking habits at the end of the study by characteristics of pregnant and non-pregnant women registered at inclusion*

Characteristics registered at inclusion	Pregnant women: Stopped smoking after 18 months n = 45 (SD)	Pregnant women: Still smoking after 18 months n = 305 (SD)	Pregnant women: Significance P value	Non-pregnant women: Stopped smoking after 18 months n = 43 (SD)	Non-pregnant women: Still smoking after 18 months n = 231 (SD)	Non-pregnant women: Significance P value
Mean age (years)	27.0 (4.0)	25.7 (4.1)	0.03	27.9 (3.6)	27.6 (4.5)	0.69
Mean age when starting smoking (years)	16.7 (2.0)	15.9 (2.1)	0.02	16.5 (3.1)	16.2 (2.6)	0.5
Mean daily cigarette consumption	9.1 (4.7)	9.5 (4.8)	0.6	12.5 (4.8)	13.5 (6.8)	0.2
Mean value of serum thiocyanate (μmol/l)	71.0 (25.7)	84.7 (28.7)	0.002	87.7* (33.9)	102.2* (33.9)	0.03
Percentage of partners who were smoking	51.1	71.9	0.004	60.0	73.8	0.07
Percentage of partners who had encouraged the women to stop smoking	73.3	55.4	0.02	56.4	39.5	0.05

* Analyses of serum thiocyanate were not performed among non-pregnant women in the control group.

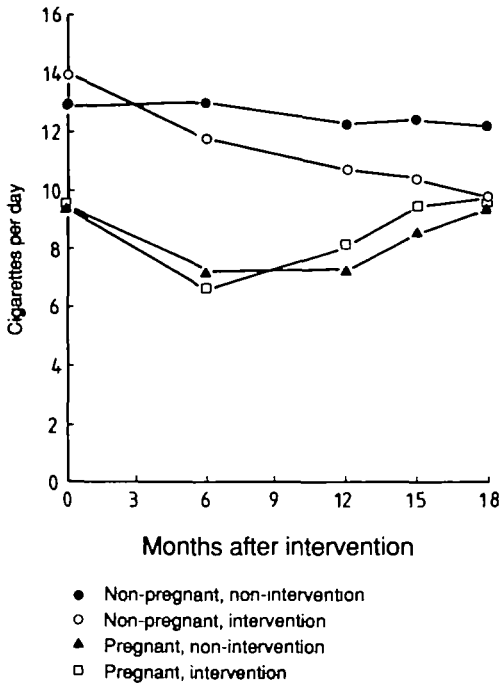

FIGURE 1 *Mean values of cigarettes smoked per day 6, 12, 15 and 18 months after inclusion*

(102.3 versus 93.1 μmol/l, $P = 0.16$) and non-pregnant women (106.0 versus 86.4 μmol/l, $P = 0.04$).

Pregnant women who consulted female GPs stopped smoking more often than those who consulted male GPs (19 versus 11%, $P = 0.08$). No such difference was found among non-pregnant women. The smoking cessation rate showed no correlation to the age of the GP or the number of consultations per day.

DISCUSSION

With regard to the point prevalence abstinence rate, twice as many pregnant women in the intervention group stopped smoking during the study period, compared with pregnant women in the control group (15 versus 7%). The results can be compared with 10 other smoking intervention studies among pregnant women. In these studies, the point prevalence abstinence rate 12 months after inclusion varied from 6 to 28% in the intervention groups and 2 to 14% in the control groups.[10–12]

The point prevalence abstinence rates among non-pregnant women in our study were 20 and 7% in the intervention and control groups respectively. In corresponding intervention studies from general practice, the point prevalence abstinence rate after 12 months varied between 17 and 19% in the intervention groups and 10% in the control groups.[5,8] We found 1 year continuous abstinence rates of 5 and 1% in the intervention and the control groups respectively, among non-pregnant women, which was close to that found in Russel *et al.*'s classic study (5.1%/0.3%).[5] However, other studies have not demonstrated any difference.[13,14] Longer, more frequent and more intensive consultations seem to result in a higher cessation rate.[15]

Prior to inclusion, the GPs had screened 2379 pregnant women. Of the women who smoked during the last 3 months before conception, 16% reported that they had stopped smoking before the first check-up in pregnancy.[2] We presume, therefore, that the pregnant women in our study belonged to a selected group of smokers being more addicted to tobacco than the non-pregnant women who agreed to participate in the study.

At the end of the study, the mean number of cigarettes smoked per day was the same among pregnant and non-pregnant women in the intervention groups. Although the cigarette consumption among pregnant women was the same at inclusion and at the end of the study, we have previously reported that pregnant women reduced their cigarette consumption by 31% before the first check-up in pregnancy.[2] Among non-pregnant women, there was a 30% reduction in cigarette consumption during the study period. Thus the reduction was virtually the same among both pregnant and non-pregnant women in the intervention groups.

Each GP recruited a mean number of 5.4 women. It may be argued that the results might have been better had the GPs included more women in the study and received more training in this specific health promotion effort. However, the number of daily smoking pregnant women reflects the factual frequency of these patients in general practice. The results are therefore probably quite realistic with regard to GP involvement, time consumption and smoking cessation rate.

A large number of daily-smoking non-pregnant women consult their GPs each year. In our study the GPs were instructed to include consecutively four daily-smoking non-pregnant women during the study period. We had expected that the necessary number of non-pregnant women had been recruited within a few months. Since the recruitment of non-smoking women turned out to be slow, and some of the participating GPs did not succeed in recruiting the expected four women, a selection probably has taken place. The effect of such a selection might be either positive or negative with regard to cessation rate. If the GPs have recruited heavy smokers, a 'hard core' of smokers have participated and the cessation rate will be low. On the other hand, if women who have indicated a request for smoking cessation were included, a highly motivated group of women has participated and the cessation rate will be high. We believe that both mechanisms have taken place.

Since 398 GPs initially were invited to participate in the study and 187 of them actually participated, a selection of GPs positive to this specific study has ob-

viously taken place. However, binding oneself to participate in a study which should last for 30 months is a challenge for each responder. None of the GPs had previously participated on an organized smoking intervention and they received no specific education in smoking cessation techniques or patient counselling before or during the study period. We are not aware of any other smoking intervention study which has included so many participating GPs. We therefore believe that the results are at least as representative for general practice as any other results published so far.

CONCLUSION

We have demonstrated a significant effect of a simple smoking intervention programme carried out by a large number of GPs. The effect was nearly the same among pregnant and non-pregnant women with regard to stopping smoking. This finding is promising since pregnant women belong to a selected group of smokers. Concerning mean daily cigarette consumption, however, a positive 'effect' of the intervention was observed among the non-pregnant women only.

We are convinced that there is a potential for more women to become non-smokers during the periods of pregnancy and child infancy. It is suggested that GPs should receive more training in this specific health promotion effort. In addition, more effective, low cost smoking intervention programmes, designed for pregnant women, should be explored.

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