

Individually Tailored Medical Counseling for Pregnant Smokers

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OBJECTIVES: To identify the characteristics of smoking addiction in a group of pregnant women, to evaluate the efficacy of medical counseling tailored to the patient's stage in the cessation process and to examine factors that might affect the ability of a woman to quit smoking during pregnancy.

PATIENTS AND METHODS: One hundred sixteen women (mean (SD) age 29.71 (5.44) years (range 15-41) were referred by obstetricians to a respiratory medicine specialist if they continued smoking after being advised to quit. The information each woman received was appropriate to her stage in the cessation process and covered the risks that smoking posed for her child and the benefits that would come from quitting. Each woman was provided with guidelines for quitting and helped to choose the first day to start the cessation process. The women received follow-up counseling sessions after the first and third months.

RESULTS: Twenty-seven women (23.3%) quit smoking, 18 (15.52%) advanced a stage in the cessation process and 30 (25.86%) smoked less. Overall, the program benefited 60 women (51.7%) who quit smoking, reduced the number of cigarettes they smoked or progressed to a new stage.

CONCLUSIONS: The results reveal that most pregnant smokers need the intervention of specialists with knowledge of smoking addiction to facilitate the cessation process.

Key words: Smoking treatment. Pregnancy. Women. Physician counseling.

Consejo médico personalizado en el tratamiento del tabaquismo en el embarazo

OBJETIVOS: Identificar las características del tabaquismo en un grupo de mujeres embarazadas, valorar la eficacia del consejo médico adecuado a la fase de abandono del consumo de tabaco y examinar los factores que podrían influir en la capacidad de dejar de fumar durante el embarazo.

PACIENTES Y MÉTODOS: Se incluyó en el estudio a 116 mujeres fumadoras (edad media, 29,71 ± 5,44 años; límites, 15-41), remitidas consecutivamente a una consulta de neumología, que habían acudido a las consultas de obstetricia para el control de su embarazo y seguían fumando tras la recomendación de dejar de fumar. En función de la fase de abandono se les entregaba información sobre tabaquismo en la que se especificaban los riesgos del tabaquismo para su hijo y los beneficios de dejar dicho hábito, se les suministraba una guía para dejar de fumar y se les ayudaba a decidir el primer día en que dejarían de fumar. Se hicieron visitas de seguimiento al primer y tercer meses.

RESULTADOS: De las mujeres incluidas en el estudio, 27 dejaron de fumar (23,3%), 18 evolucionaron en el proceso de cambio de fase (15,52%) y 30 disminuyeron la intensidad de su consumo (25,86%). Globalmente, el programa benefició a 60 mujeres (51,7%) que abandonaron el tabaco o redujeron el número de cigarrillos y/o evolucionaron en el proceso de cambio de fase.

CONCLUSIONES: Los resultados de este estudio ponen de manifiesto la necesidad de la intervención de los especialistas con formación en tabaquismo, para facilitar el abandono del consumo de tabaco en la mayoría de las mujeres fumadoras durante el embarazo.

Palabras clave: Tratamiento del tabaquismo. Embarazo. Mujer. Consejo médico.

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Introduction

Smoking is the leading cause of preventable death and disability in most developed countries.¹ Pregnancy is a time during which health care is of special concern and theoretically should provide strong motivation for a woman to quit. Nevertheless, in spite of the health risk smoking poses for children, the intention to quit has not been found to be significantly different in pregnant and

nonpregnant smokers,² and it is striking that a high percentage of pregnant women smoke while only a small percentage quit during pregnancy.³

A Spanish study found that the prevalence of smoking at the start of pregnancy was 58% and that only a third of those women quit while pregnant.⁴ Moreover, 24% had received no recommendation to quit from their doctors.

Research has shown that a fetus is exposed to the smoke from a mother's cigarettes. Jordanov,⁵ for example, found that the amniotic fluid concentration of cotinine, a metabolite of nicotine, is 8-fold higher in smokers than in non-smokers.

A mother's smoking during pregnancy can affect the health of her future child in a variety of ways,⁶ in particular by increasing the likelihood of respiratory or otorhinolaryngological problems or of premature death.⁷ The prevalences of asthma and symptomatic asthma are higher among children exposed to maternal smoking during gestation than among unexposed children,⁸ with odds ratios (OR) of 1.8 and 2.3, respectively,⁹ such that removing intrauterine exposure to maternal smoking could prevent between 5% and 15% of asthma cases in children.⁹

An interesting Danish study enrolling 25 102 children showed that intrauterine exposure to smoking doubled the risk of stillbirth (OR=2) and increased infant mortality in the first year of life (OR=1.8).¹⁰ The risk for children of women who quit smoking during the first trimester of pregnancy was fortunately similar to that of children of nonsmokers, such that if all pregnant smokers quit before the 16th week, 25% of all stillbirths and 20% of first-year infant deaths would be avoided. It is therefore possible to reduce infant mortality by implementing interventions designed to reduce the number of pregnant smokers, and such an undertaking should be an authentic public health priority in our opinion.

A doctor's advice to quit smoking is one of the most cost-effective interventions available.¹¹ One multicenter study showed that a minimal intervention tailored to a patient's stage in the cessation process gave good results in terms of both successful abstinence and progress to a higher stage of change.¹² Nevertheless, such counseling is not usually given.¹³

In the case of pregnant smokers, the administration of the usual pharmacological aids are formally contraindicated¹⁴ and personally tailored medical counseling should therefore have an important place in the therapeutic armamentarium. Such counseling has hardly been studied in Spain, however, and to our knowledge its specific application by physicians specially trained in smoking dependence has never been considered.

We performed an open observational study of care given to a group of pregnant smokers by respiratory

medicine specialists trained in smoking addiction, with the aim of identifying the characteristics of dependence among pregnant women in Spain, to assess the efficacy of medical counseling tailored to a patient's stage in the cessation process, and to analyze factors that might influence the ability to quit smoking during pregnancy.

Material and methods

Patients

All pregnant smokers receiving obstetric care at 4 clinics in Area 4 of the Valencian Autonomous Community between September 1, 2001 and March 31, 2002 were enrolled. The women were referred by an obstetrician or midwife because of an inability to quit smoking after having been advised to do so. The following protocol was applied when treating each woman:

1. Medical history. Data related to the history of smoking dependence were gathered (age when smoking started, number of cigarettes per day, presence or not of a smoker partner, previous attempts to quit, and reasons for failure), along with other patient characteristics (gestational age, profession, previous illnesses).

2. Diagnosis of stage of change in the cessation process. Stage diagnosis was performed using the method recommended by the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR).¹⁵

3. Evaluation of level of nicotine dependence by means of a modified Fagerström test.¹⁵

4. Measurement of expired air carbon monoxide (CO) levels. A Micro-Smokerlyzer (Bedfont Technical Instruments Ltd, Kent, UK) CO-oximeter was used. The patient exhaled slowly into the mouthpiece of the CO-oximeter 15 seconds after having taken a deep breath.

5. Treatment. Smokers in the precontemplation stage were given literature explaining the health risks that smoking posed for the child in terms of morbidity and mortality and the benefits to be derived from quitting. This literature included a summary of 2 reviews of the topic that had recently been published in Spanish.^{6,16} Smokers in the contemplation phase were given the same literature plus a practical guide organized around 10 steps for quitting smoking developed by the Smoking Addiction Assembly of SEPAR.¹⁵ Smokers in the preparation or action stage were additionally helped to decide the first "nonsmoking" day. For women in the precontemplation stage, both the brochure and the doctor's counseling emphasized information about smoking dependence (about risks, but especially about the benefits for the child when the mother quits), whereas for women in the contemplation stage, counseling targeted increasing their confidence to try again to quit and teaching them to reach positive conclusions about past failed attempts.¹²

6. Follow-up. All the pregnant smokers were followed for 3 months. The first visit took place during the first month of the intervention. Information about current smoking was taken from each patient and changes in cessation stage were assessed at each visit. Expired air CO was also measured.

7. Data analysis. The outcome was assessed from 2 points of view: *a*) efficacy of the intervention for treating pregnant smokers, and *b*) benefit of the intervention on influencing the process of smoking cessation or reduction of the intensity of smoking.

A pregnant woman was considered a smoker if she smoked 1 or more cigarettes per day and/or her concentrations of expired air CO were over 10 ppm and/or she did not come to follow-up visits. The patient was considered a nonsmoker if an expired air CO-oximeter reading of 10 ppm or lower confirmed her declaration of abstinence.

Statistical analysis

Table 1 shows the data collection sheet and codes assigned to variables. Answers were scored according to their nature, such that quantitative data were recorded using real numbers and qualitative data were assigned numbers reflecting categories.

Spearman's rank correlation coefficient (ρ) was calculated to assess the relation between the treatment outcome and each other variable in order to determine the patient features or other factors associated with a positive response to the intervention (quitting or benefiting from the intervention).¹⁷

Descriptive statistics were reported as means (SD) and ranges for quantitative variables and as the number of subjects in each category and percentages for qualitative variables. Statistical significance was set at .05.

All calculations were performed on a Toshiba Satellite 1900-102 personal computer using the SPSS (version 10.0) package for Windows.

Results

Patient characteristics

One hundred sixteen women with a mean age of 29.71 (5.44) years (range 15–41 years) were treated. Mean gestational age was 15.13 (9.10) weeks (range 4–39 weeks) and age of onset of smoking was 15.18 (2.34) years (range 9–28 years). Most of the women (76.5%) had begun smoking by age 16 years. The mean number of cigarettes smoked was 15.35 (8.16) (range 2–45). Smoking fewer than 10 cigarettes per day was reported by 18.1%. Expired air CO was 15.11 (7.51) ppm (range 4–35 ppm).

The score for physical dependence on nicotine (modified Fagerström test) was 4.01 (2.21) points (range 0–10); 45 women (38.8%) had scores less than 4, and 71 (61.2%) had scores of 4 or more. Seventeen (15%) of the latter had scores indicating high physical dependence on nicotine (7 or higher).

Seventy-three women (62.9%) were experiencing their first pregnancy and 43 (37.1%) had had 1 or more prior pregnancies.

Sixty-nine women (59.5%) had tried to quit smoking previously. Among the reasons for relapse were symptoms consistent with abstinence syndrome in 33 (48.5%), and social pressures in 21 (31%). Fourteen (21%) mentioned other reasons. It is noteworthy that none of the women in this series mentioned weight gain as the reason for relapse.

Seventy-three (62.9%) reported no prior disease, 10 (8.6%) reported respiratory diseases such as asthma or pneumonia, 1 (0.86%) had cardiovascular disease, 4

TABLE 1
Variables analyzed, with their assigned scoring codes

Variables	Codes
Referral	1. SSI obstetricians 2. Public health service midwives (Area of Valencia, Spain) 3. Hospital obstetricians 4. Other
Age	Years
Gestational age	Weeks
No. of pregnancies	Ordinal number
Smoking partner	1. Yes 2. No
No. of cigarettes	Cigarettes/day
Prior attempts to quit	1. Yes 2. No
Reason for failure	1. Anxiety-nervousness 2. Social reason 3. Weight gain 4. Other
Stage in the cessation process	1. Precontemplation 2. Contemplation 3. Preparation 4. Action
Medical history	1. No 2. Respiratory diseases 3. Cardiovascular diseases 4. Depression 5. Other
Profession	1. Unemployed 2. Housewife 3. Public employee 4. Salaried worker 5. Business owner 6. Other
Quit smoking	1. Yes 2. No
Stage change (advance) in the cessation process	1. Yes 2. No
Reduction in number of cigarettes	1. Yes 2. No

SSI indicates Seamen's Social Institution (*Instituto Social de la Marina*).

(3.4%) had experienced depression, and 28 (24.1%) had other diseases.

Eight women (6.9%) were unemployed, 23 (19.8%) were housewives, 65 (56%) were salaried workers, 6 (5.2%) had their own business and 14 (12%) had other professions or situations (students, etc.).

Eighty-seven (75%) reported having a husband or partner who smoked and 21 (18.12%) a partner who did not; this information was unavailable for 8 women (6.9%).

Forty-nine women (42.2%) were in the pre-contemplation stage, 29 (25%) in contemplation, and 38 (32.2%) in preparation or action stages. Thus, 78 women (67.8%) were not intending to quit smoking during the first trimester of their pregnancies.

TABLE 2
Characteristics of the 27 pregnant women who quit smoking

Patient no.	Gestational age (week)	Cigarettes/day	Stage	Fagerström (score)	CO air (ppm)	Smoker partner
13	9	15	Preparation	5		Yes
22	6	10	Contemplation	4	24	No
23	9	3	Precontemplation	4	6	No
24	15	3	Precontemplation	4	8	Yes
30	33	3	Preparation	4	3	Yes
33	12	30	Preparation	4	8	Yes
34	10	15	Precontemplation	4	8	No
37	8	10	Preparation	6	7	No
41	8	10	Preparation	4	6	Yes
45	12	6	Contemplation	4	13	Yes
47	18	8	Preparation	4		Yes
54	13	3	Preparation	4	10	Yes
64	11	5	Preparation	4	14	Yes
66	18	20	Contemplation	6	12	Yes
68	14	10	Preparation	6	22	No
73	32	10	Preparation	5	18	Yes
78	7	30	Preparation	5	14	No
80	10	6	Contemplation	6	11	Yes
85	10	20	Preparation	7	34	
86	20	20	Precontemplation	5	17	Yes
94	13	20	Contemplation	8	35	Yes
99	20	10	Preparation	4	6	
101	12	20	Preparation	6	12	No
108	39	15	Action	4	5	No
111	13	10	Preparation	4	30	Yes
113	8	20	Contemplation	4	22	Yes
114	10	20	Contemplation	6	15	Yes

Efficacy of the program

In the visit that took place between 1 and 3 months of the first visit, 27 women (23.3%) had quit smoking, 71 (61.2%) had not, and 18 (15.5%) did not come to the appointment. Assuming that the women who did not come to the appointment did not quit smoking, 89 women were still smokers.

Among the 71 women who had not quit and came to their appointments, 18 (25.4%) progressed to a higher stage in the cessation process (20.2% of all those assumed to still be smoking).

Thirty (42.2%) of the 71 women who came to their appointments and who had not quit had reduced their smoking (33.7% of all those assumed to still be smoking).

Overall, benefit from the program, understood as its impact on quitting, on reducing the number of cigarettes smoked, or on progressing to a higher stage of change was observed for 60 women (51.7%) in comparison with 56 women (48.3%) who did not quit, reduce smoking, or advance a stage in the cessation process.

Tables 2 through 4 show the characteristics of women who quit smoking, changed stage or reduced their smoking, respectively.

Factors related to program success

Quitting was significantly related to, or tended to be related to, the following variables: number of pregnancies ($\rho=0.194$; $P=.056$); age at onset of

TABLE 3
Characteristics of the 18 pregnant women who progressed to a higher stage of change

Patient no.	Gestational age (week)	Cigarettes/day	Stage (before)	Stage (after)
1	8	30	Preparation	Action
6	14	12	Preparation	Action
12	10	20	Contemplation	Action
14	9	20	Preparation	Action
17	7	20	Preparation	Action
20	7	20	Preparation	Action
35	6	30	Contemplation	Action
38	8	8	Contemplation	Action
39	8	10	Contemplation	Action
53	32	20	Preparation	Action
65	8	8	Preparation	Action
69	18	10	Contemplation	Action
88	7	10	Contemplation	Action
95	9	20	Precontemplation	Preparation
106	18	10	Preparation	Action
111	13	10	Preparation	Action
112	11	12	Contemplation	Action
116	17	10	Contemplation	Action

TABLE 4
Characteristics of the 30 pregnant women who reduced their smoking

Patient no.	Gestational age (week)	Cigarettes/day (before)	Cigarettes/day (after)	Fagerström (score)
1	8	30	10	6
3	20	20	15	4
4	27	20	1	4
6	14	40	10	8
8	12	12	3	4
9	9	15	3	1
12	10	20	2	4
14	9	20	6	3
17	7	20	5	5
20	7	20	15	6
21	14	5	2	4
38	8	8	3	2
44	8	10	2	4
46	8	30	1	4
53	32	20	15	6
59	36	20	3	4
69	18	10	3	5
76	29	15	10	4
79	5	30	2	7
84	8	20	8	6
85	10	20	13	7
86	20	20	1	5
87	21	11	1	7
91	17	20	6	5
95	9	20	4	2
97	32	5	3	4
110	5	10	5	4
112	11	12	8	5
115	29	20	6	2
116	17	10	7	7

smoking ($\rho=-0.193$; $P=.059$); smoker partner ($\rho=-0.186$; $P=.076$); and stage in the cessation process ($\rho=-0.294$; $P=.003$), with greater likelihood of success among women in the preparation or action stages.

Benefiting from the program was significantly related to, or tended to be related to, the following variables: age ($\rho=-0.187$; $P=.044$), with greater likelihood of success among older women; age at onset of smoking ($\rho=-0.164$; $P=.079$); and stage of change in the cessation process ($\rho=-0.325$; $P=.000$), with greater likelihood of success among women in the preparation or action stages.

Discussion

Smoking during pregnancy is the single most important modifiable risk factor for morbidity and mortality related to pregnancy in developed countries because it doubles the probability that a child will die at birth or before the age of 1 year^{7,10} and increases the likelihood that a child will develop certain diseases, most of which are respiratory⁸ or otorhinolaryngological.¹⁸ Fortunately, risk for the children of women who quit

smoking before the 16th week of pregnancy is similar to that of the children of nonsmokers.¹⁰ The problem is therefore a serious one and intervention is absolutely necessary.

Pregnant smokers make up a special subpopulation of female smokers. Because smoking can affect both the mother and her future child, women can be expected to be highly motivated to quit during pregnancy. Nevertheless, several studies have found only modest changes in smoking during pregnancy.^{19, 20}

An interesting study in 33 states in the United States of America demonstrated that the prevalence of smoking decreased similarly among both pregnant women (from 16.3% to 11.8%) and nonpregnant women (from 26.7% to 23.6%) between 1987 and 1996.²¹ Surprisingly, the decrease among pregnant women was mainly due to an overall reduction in the rate of new smokers among young women rather than to an increase in the rate of cessation related to pregnancy.

The figures for Spain are discouraging. A study performed in the Spanish Autonomous Community of Valencia found that 62% of women who gave birth smoked before pregnancy and 28% of them quit spontaneously.²² Giving up smoking during pregnancy was more frequent among women who were older (OR=2.1), had more education (OR=2.6), or smoked less than heavy smokers (1–9 cigarettes/day, OR=12.3; vs 10–19 cigarettes/day; OR=2.7). The women enrolled in the present study had not quit spontaneously; nor had they followed the initial advice of their midwives or obstetricians. For that reason they were referred to our service for diagnosis and tailored treatment of their dependence.

The present study brings out the complexity of the intervention, given the characteristics of the pregnant women who smoked and who had not followed recommendations to quit. A high percentage of them (61.2%) scored over 4 points on the Fagerström test and over half (59.5%) had tried to stop smoking previously, with relapses mainly attributed to abstinence syndrome. Moreover, 67.8% had no intention of quitting in the short term and only 18.1% were smokers of fewer than 10 cigarettes per day.

The most important benefits accrue when a woman quits in the first trimester,¹⁰ such that interventions should be most intensive during that period. We therefore analyzed results at 3 months, even though all pregnant smokers were enrolled regardless of gestational age, a factor which was not significantly related to success or failure of the program. Later studies are planned to monitor the progress of women who were motivated but who failed to quit.

The present program based on individually tailored medical counseling given by pneumologists with training in smoking addiction was effective: 27 women quit smoking entirely and the program benefited 33

other women who reduced the intensity of their smoking (with benefits for mother and child), and/or progressed a stage in the cessation process and therefore increased the likelihood of quitting later. Among such women, new interventions may increase the success rate, either during pregnancy or later.

Fifty-six women (48.3%), however, did not benefit from treatment. This was the case for young women, particularly, or for those who were in the pre-contemplation stage. It therefore seems necessary to design new programs with the characteristics of those women in mind.

The main objective of the intervention was to eliminate smoking among pregnant women. Nevertheless, those who smoked less or who progressed a stage in the cessation process also benefited, as suggested by a recent study by England et al,²³ who found that reducing smoking by at least 8 cigarettes/day was associated with increased birth weight.

We were interested in knowing the effect of a partner's smoking on a pregnant woman's habits, given that if the influence proved negative, the program would need to be extended to the couple. An interesting Spanish study by Jané et al²⁴ recently analyzed the factors affecting a woman's quitting during pregnancy, finding that the probability that a woman would quit increased if her partner did not smoke (OR=1.78).

In our study, a smoker partner was present in 75% of cases, a higher prevalence than that in the Spanish population overall.²⁵ Although this variable tended to be associated with poor response to the intervention (Spearman's ρ), it did not reach statistical significance, probably due to the small sample size. Spearman's ρ is a variation of the Pearson product moment correlation that assigns limits to ordinal values as opposed to measuring the degree of linear correlation between the data themselves.¹⁷

Economically speaking, the cost of smoking during pregnancy is high. Miller et al²⁶ estimated that the sum of additional costs attributable to smoking in the first year of life ranged between US \$1142 and \$1358 for every pregnant smoker. More recently, Adams et al²⁷ estimated additional neonatal costs to be around US \$700 for smoker mothers, such that neonatal costs attributable to smoking in the United States of America represented nearly \$636 million in 1996.

Smoking is now considered a chronic disease that requires an appropriate diagnostic and therapeutic approach. In keeping with SEPAR guidelines,¹⁵ treatment for smokers is currently based on both individually tailored medical advice with psychological support and pharmacological aids (nicotine replacement therapy and bupropion). The safety of drug treatment has not been firmly established for pregnant women, however.

Nicotine replacement therapy is considered contraindicated for these patients in Spain, according to drug

packaging inserts. The US Food and Drug Administration, however, while initially including nicotine gum in category X (unacceptable risk for the fetus; not to be used during pregnancy), changed that classification in 1992 to category C (no controlled studies have been done in women; only to be used if benefit exceeds risk). The remaining formulations are placed in category D (risk for the fetus, but benefit may exceed risk).¹⁴

Animal experiments indicate that nicotine adversely affects fetal central nervous system development and its effects on the brain may be implicated in the pathophysiology of sudden infant death syndrome.²⁸ Nevertheless, it is unlikely that the toxicity of smoking during pregnancy is exclusively related to nicotine, such that nicotine replacement therapy might theoretically be less prejudicial than continuing to smoke. In any case, as some authors have pointed out, it seems necessary to continue studying this question.²⁸

For bupropion, data are not yet available on effects during pregnancy, and its use is therefore formally contraindicated.²⁹

In conclusion, smoking during pregnancy constitutes an important public health problem. Our study demonstrates the need for intervention by specialists trained in smoking addiction to facilitate the cessation process among most women who smoke during pregnancy.

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