

Smoking and cystic fibrosis

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INTRODUCTION

The harmful effects of smoking are now well documented^{1,2}. The UK figures are disturbing: although the prevalence of smoking for adults is falling, in children it has been steadily rising since 1992³. Passive smoking has been implicated in lung cancer, heart disease and respiratory diseases^{4,5}. Children are most vulnerable to passive smoking, especially if they already have preexisting lung disease⁶. Cigarette advertising has been implicated in the increasing incidence and prevalence of smoking, especially in children⁷. The majority (96%) of 11–15-year-olds can recall cigarette advertising, and 56% can name one sport linked with cigarette advertising.

There have been several papers looking at the incidence, prevalence and effects of active and passive smoking in the cystic fibrosis (CF) population^{8–15}. This paper reviews the current literature on active and passive smoking in cystic fibrosis and reports the findings of a recent questionnaire to adult CF patients attending the Manchester Unit. The survey details the levels of active and passive smoking in CF patients and their parents, the perceptions of how smoking affects their health, and provides recommendations for care and cessation.

Active smoking

Studies have shown that active smoking is prevalent in the CF population^{8–10}. The age of onset was often later than in their peers (mean 13–14 years, compared to 11–12 years), but 21% ($n=24$) had tried smoking⁸, 11% ($n=13$) were smoking, and 20% ($n=23$) had tried other substances, including marijuana⁹. The prevalence (21.1%) of active CF smokers seemed similar to an age-matched population in one study⁸, but was lower (12%) in another study⁹; the range of cigarette consumption varied between 2 and 60 pack-years⁹. Stern *et al.*⁹ found that CF was a major reason for not starting smoking. Of the CF smokers, most thought smoking had no pulmonary side-effects. Although there was spirometric decline, it was similar to controls, but this could be because neither group had yet smoked enough to develop respiratory symptoms⁹.

In another study, which looked at CF patients and controls, it was found that the forced expiratory volume in 1 s (FEV₁) was reduced by 4% for every 10 cigarettes smoked, whereas forced vital capacity (FVC) reduced by 3% for every 10 cigarettes smoked¹⁰. Bronchial hyperresponsiveness did not seem to be affected by either active or passive smoking¹¹. There may also be an improvement in spirometric deterioration when the patient decides to stop smoking¹¹.

There is a dose-dependent relationship between the number of cigarettes smoked and the severity of disease. As well as growth suppression, the number of intravenous days were greatly increased, as well as the frequency of infective exacerbations¹². It was also found that girl smokers were often clinically worse than boys. As with non-CF smokers, socioeconomic factors were also involved¹².

The important message from these papers is that there are sufficient prevalence data to show the harmful effects of active smoking, and studies are needed to look at interventions and their outcomes¹¹.

Passive smoking

When the salivary cotinine of CF patients was measured, parental smoking was estimated to produce the equivalent of the patient actively smoking 80 cigarettes per year¹⁴. Pulmonary function and an increased tendency for chest infections correlated with parental smoking¹⁴. Maternal smoking seemed to be more harmful to the patient than any other member of the family smoking¹⁴.

A Canadian series which looked at a 15-year cohort confirmed the European data. This study found that children exposed to passive smoking had lung function which was affected by a number of factors¹⁵. Those patients who were never exposed to passive smoking were better than those whose families had initially smoked and then stopped. However, the only statistically significant correlation was that the height of patients exposed to passive smoking was reduced compared to that of their peers. They were also from lower socioeconomic classes, where nutrition may be poorer¹⁵. Patients who were exposed to passive smoking did not have any statistically significant reduction in their small airway function, probably due to the poor reproducibility of this measurement, which makes it difficult to detect small changes¹⁵. The authors suggested that maternal smoking during gestation, the duration of

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exposure, room size and ventilation may be important. Small and statistically insignificant reductions in spirometry may be clinically significant in patients with severe airflow limitation who are exposed to smoke¹⁵.

Data from similar studies performed in normal populations and asthmatic groups revealed similar results^{14,15}.

The incidence of parental smoking was found to be higher in CF parents than in the normal population^{13,14}; however, 80% of parents did reduce or try to stop smoking when their child was diagnosed as having cystic fibrosis¹³. It is well recognized that people underestimate their tobacco consumption, which was made worse if the burden of guilt was high¹⁴. The effects of smoking are difficult to evaluate, with some authors finding contradictory evidence. Small sample sizes, short cohorts and subtle changes could lead investigators to very different conclusions; however, from studies in normal population smoking is widely described as causing multiple medical conditions, resulting in increased morbidity and mortality^{1,2,4-6}.

A QUESTIONNAIRE SURVEYING SMOKING IN THE MANCHESTER ADULT CF UNIT

The aims of the study were to determine how many patients in the Unit smoked and were exposed to passive smoking at the same time in their life. If they smoked, they were asked about their perceptions and feelings about smoking and CF. Further questions surveyed the interest of patients, relatives and friends who would like to help to give up smoking and would welcome smoking cessation advice. The questionnaire was anonymous, self-administered, confidential, and in a semistructured format with 14 items. It was distributed to 232 patients either by post or at clinic attendance; 169 (72.8%) replies were received.

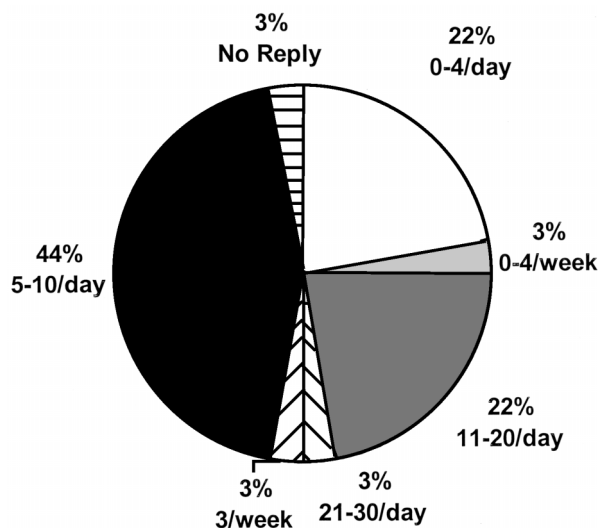


Figure 1 Number of cigarettes smoked by patients (n=36)

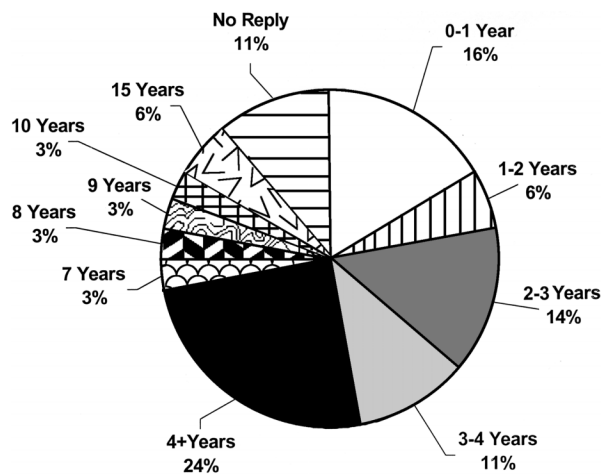


Figure 2 Number of years smoking (n=36)

Active smoking results

Out of the 169 returns 129 patients (76%) had been exposed to a smoking environment; 21% (n=36) had smoked at one time and 8% (n=13) were currently smoking; 91% (n=32) of these patients smoked cigarettes alone, and one person admitted to smoking other substances; 44% smoked between 5 and 10 cigarettes per day and 22% 11–20 cigarettes per day (see Figure 1). Worryingly, out of the 36 smokers, 6% had been smoking for 15 years or more and 16% had started smoking in the last 12 months (see Figure 2). The influence of friends and ‘being sociable’ were the major reasons for starting smoking. It was interesting that only three out of the 34 responders smoked because members of their family were smokers.

The reasons given for continuing smoking were ‘habit’ rather than pleasure or social enjoyment. Of the current smokers (n=14) all were interested in giving up, and the majority were ‘having a go’ at giving up or ‘thinking about’ giving up (Figure 3). The majority of patients who had tried to stop smoking used willpower alone.

Most patients knew that smoking affected their chest, either by affecting their spirometry (n=27) or by increasing the number of chest infections (n=22), sputum production (n=16), shortness of breath (n=15) and tightness (n=20). Many did not appreciate that the non-pulmonary problems, such as appetite reduction, weight loss, loss of sense of taste and sleeping pattern disturbance, were smoking related (Figure 4).

Passive smoking

Passive smoking was also found to be prevalent, with parents and grandparents often being the main influence in childhood, and friends and work colleagues in adulthood

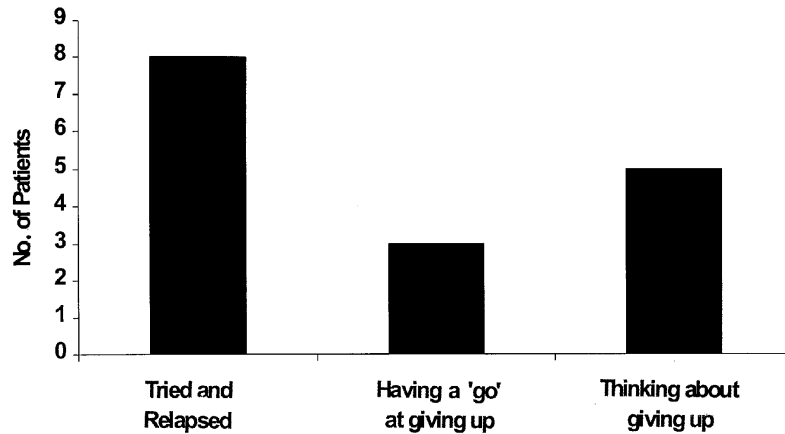


Figure 3 Methods used for smoking cessation (n=14)

(Figure 5). Of concern, four patients said that someone in the same room would be smoking while they were doing their treatment.

Thirteen out of the 14 patients who were currently smoking stated that they would like help to stop, and a vast majority of friends and relatives also wanted support to help them stop (Figure 6).

SMOKING CESSATION

It has been clearly documented that there are major health benefits in stopping smoking at any age or after however long becoming a smoker¹⁶. Patients who successfully stopped smoking said counselling from their health provider was important for their motivation¹⁶. Willpower alone is often not associated with a successful outcome, and advice

from doctors, structured intervention by nurses and counselling are all effective¹⁷. Generic self-help documents are not as helpful as personalized material¹⁷.

Although patients often wish to give up, it is their nicotine addiction that often causes them to continue smoking or relapse¹⁶. It is usually the tar and gases that cause the damage and the nicotine that causes the dependence¹¹. Nicotine replacement therapies in all forms are effective¹⁷. The different preparations that have been studied include chewing gum, transdermal patches, nasal spray, inhalers¹⁸, sublingual tablets and lozenges. The Cochrane Review studied over 90 trials and found that the increase in cessation is between 1.5 and 2 times greater if people are given nicotine replacement therapy. There is no evidence to suggest that one preparation is better than another¹⁷, but some evidence to suggest that a combination

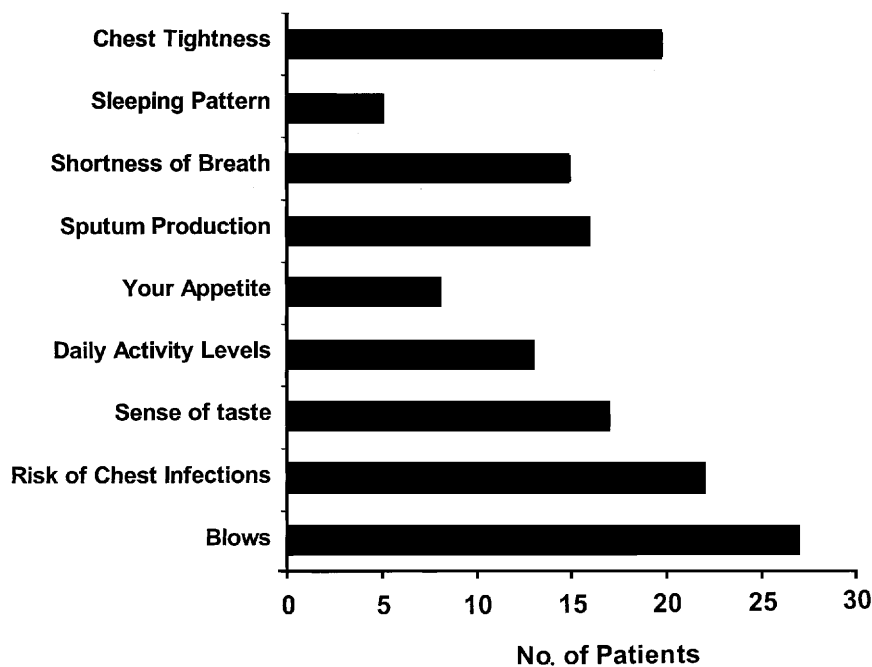


Figure 4 Patient perceptions of smoking side-effects (n=35)

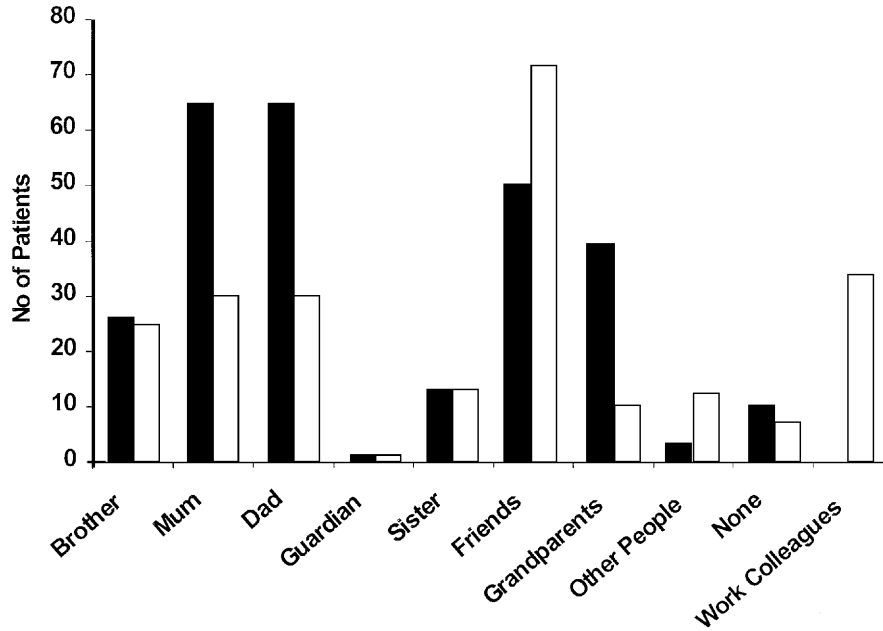


Figure 5 Number of patients exposed to passive smoking now □ and in childhood ■ (129 replies)

of replacement to cover cravings with a fast- and short-acting preparation and a background level would be more effective¹⁷.

Antidepressants such as bupropion (Zyban) have been shown to improve cessation rates in a small number of trials, but in CF the antimuscarinic side-effects may be more problematic. A study of bupropion with and without nicotine patches showed no significant differences between the two groups¹⁹. However, there were a large number of people who withdrew, 23% due to side effects of the

bupropion, either alone or with the patches. Other agents have not been shown to be as effective, and alternative therapies, such as hypnotherapy and acupuncture, are no better than placebo¹⁷ though may help in individual cases.

MARIJUANA

It is well recognized that people prefer to smoke marijuana than to ingest it: this may be because this increases the bioavailability of the active metabolites by 5–10 times¹⁸.

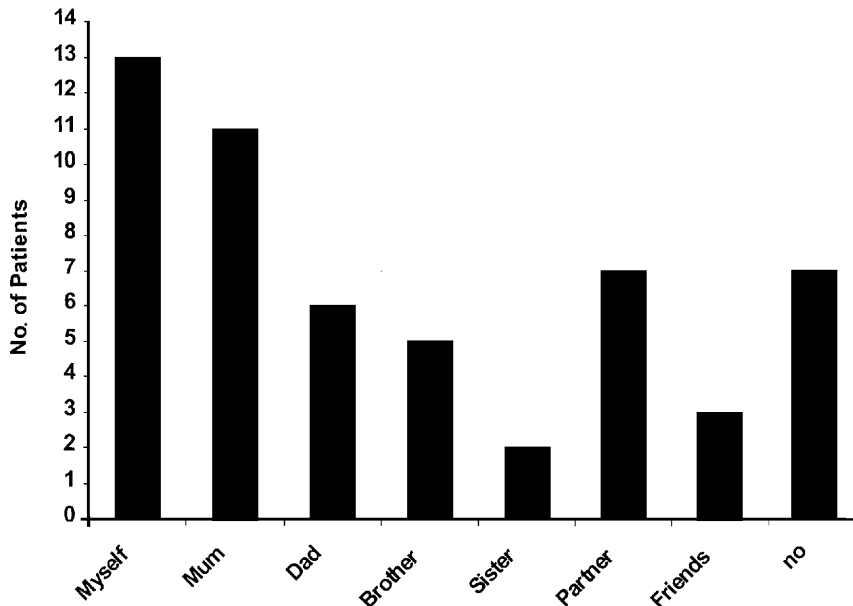


Figure 6 Number of patients, relatives, partners and friends interested in receiving support for smoking cessation

Not only have the metabolites been implicated in obstructive disease²⁰, focal alveolitis²¹, granuloma formation²² and bronchiectasis²³, but they may also be teratogenic in nature²⁴. There is also an increase in carbon monoxide and tar levels similar to those of tobacco alone²⁵. Animal models have suggested that marijuana may destroy lung defensin systems²⁶.

There have been no long-term studies looking at marijuana use in the CF population, but several papers have observed a disturbing prevalence of up to 60%^{8,9}.

Some patients may find they obtain transient bronchodilator effect from smoking marijuana, but this benefit is very short-lived and patients need to be aware of the long-term damage from both the tobacco products and the metabolites of the marijuana.

RECOMMENDATIONS

Screening CF patients for active and passive smoking

Studies which recommend screening for smoking found that urinary cotinine levels were significantly raised in CF patients who smoked compared to controls¹⁰. Cotinine is a metabolite of nicotine but has a longer half-life (19 h), and so can be measured non-invasively in urine or saliva. However, not all laboratories have facilities to measure levels. Cotinine is a good indicator of chronic exposure; carbon monoxide and carboxyhaemoglobin levels are good indicators of recent inhalation because their half-lives are only 4 h. A heavy smoker may have a carbon monoxide count of over 80 parts per million (ppm) compared to a non-smoker with less than 5 ppm. However, carbon monoxide levels can be influenced by other extraneous sources, e.g. vehicles and fuel-burning cookers. Measurement of carbon monoxide is by a breath test into a simple meter, but there are cross-infection implications, and carboxyhaemoglobin requires a blood sample¹².

We found that 76% of our patients have been and are exposed to a smoking environment either by their friends, relatives or colleagues. The value of screening is important, especially using urinary cotinine as a screening test, which is rapid, non-invasive and easy to interpret¹⁰. Perhaps cotinine levels should be measured in all patients at annual review.

Paediatric units

The smoking relatives and carers need advice and support from the paediatric multidisciplinary team, and access to a smoking cessation service in order to stop smoking and remove the damaging effects of passive smoking on their child. Many parents rationalize their smoking, saying they smoke in another part of the house, or away from the child, but a recent study in asthmatic children showed that there was no difference in urinary tests for passive smoking if the

parents smoked either inside or outside the house²⁶. Another paper showed that a ban on smoking in public places, at home and at school might reduce the levels of teenage smoking²⁷.

Paediatric units need to recognize that their CF patients may be smoking. This should be actively discouraged, and if they do start smoking a comprehensive cessation programme should be in place.

Adult units

Units need to be able to offer a range of confidential services for patients and families with 1:1 follow-up, home visits, including support for the patient's family, and a chance to attend a smoking cessation clinic. A wide range of specific and personalized information on smoking and health-related issues needs to be made available to help patients remain abstinent. Help in finding the most appropriate cessation intervention, which fits into their lifestyle and is not too time-consuming, is also important, because their burden of treatment is already very great³⁰.

CONCLUSIONS

There is now compelling evidence from the prevalence data in CF for clinics to set up a smoking cessation service for patients, friends and relatives. There are enough data to support the various forms of nicotine replacement therapies with or without other treatment modalities, and cost-effective measures are available to detect passive and active smoking activity in patients. However, some of the burden lies in legislation¹⁷ and social awareness and, as Campbell¹⁹ states, 'Parliament may have the cure at their disposal'.

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