Management of nicotine dependence in respiratory disorders smokers at risk for cardiovascular co-morbidity

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Abstract: Tobacco consumption has been recognized to harm human health, with special consideration to respiratory and cardiovascular risks. Cardiovascular co-morbidity is often encountered at smokers diagnosed with chronic respiratory disorders and this is increasing considerably mortality risk. We have conducted a study to determine impact of cardiovascular risk on smoking cessation outcomes in chronic respiratory disorders (CRD) smokers. We found 49% CRD smokers at cardiovascular risk and we have studied smoking cessation outcomes in both CRD with and without cardiovascular risk. All study population received smoking cessation counseling +/- medication (varenicline standard 12 weeks cure), upon request, based on smoking status evaluation and smoking cessation motivational interview. We have found higher compliance to pharmacological treatment of nicotine dependence in CRD smokers at cardiovascular risk, compared to CRD smokers alone and higher quit smoking success rates in smokers with both co-morbidities. We concluded routinely screening cardiovascular risk is recommended in current respiratory diseases practice. Also, personalized medical and psychological approach in smokers with CRD and concomitant cardiovascular co-morbidity would increase long term smoking abstinence rates.

Key - Words: nicotine dependence, respiratory disorders, risk, smoking cessation, cardiovascular co-morbidity

1 Introduction

Globally, 1.3 billion people are identified as current smokers and about 650 million persons will die prematurely due to tobacco-related diseases [1]. Chronic tobacco consumption is a chronic relapsing condition. It is defined as nicotine dependence, as due to nicotine, an alkaloid in tobacco, smokers cannot quit/relapce to smoking even if willing to stop smoking, as they become addicted to this drug.

Tobacco use is a known cause of multiple cancers, heart disease, stroke, complications of pregnancy, chronic obstructive pulmonary disease (COPD), oral pathology, etc. It is also exacerbating many other conditions such as asthma and diabetes, compromises wound or post surgery healing and determines many other noxious health effects. In addition, recent research has documented the substantial health dangers of involuntary exposure to secondhand tobacco smoke [1].

Respiratory and cardiovascular health suffers major disorders in chronic smokers. Cardiovascular disease (CVD) is the leading cause of death worldwide. Cigarette smoking is a major avoidable risk factor for the development and progression of cardiovascular disease, including coronary artery disease (CAD), stroke, peripheral vascular disease, and congestive heart failure [2]. But also, continuing smoking has very harmful influence in onset and progression of chronic respiratory disorders.

Based on consensus expert panel, smoking cessation treatment has been recommended to be integrated in management of the patient’s respiratory condition, as risk of smoking related disease has a lot of scientific evidence in continuing smokers[3]. Moreover, patients with respiratory disease have greater and urgent need to stop smoking than the
average smoker, achieving thus beneficial improvement of their respiratory condition and of treatment outcomes. Longitudinal studies have shown that stopping smoking reduces risk of accelerated decline of FEV1 approximately to that of a never smoker [4].

On the other hand, the causality relationship between smoking and cardiovascular disease is well established, not to name but the relative risks of coronary heart disease (CHD) that may be higher than 3 [5].

Data overview found that smoking cessation reduces risk of subsequent mortality and further cardiac events among patients with CHD by almost 50% [6,7]. There is also strong evidence about one third reduced risk of death of a person that quits smoking after a heart attack or cardiac surgery. This beneficial health effect is greater than other possible interventions (such as cholesterol-lowering medications) [8].

However, speed and magnitude of cardiovascular mortality risk reduction when a smoker quits is still under debate. If some studies have found considerable risk reduction after 2-3 years, other estimate still risk exists even in 20 years quitters, by comparison to life-long no smokers [9,10].

When it comes to the relationship between smoking cessation and mortality due to cardiovascular events, it may depend on many other factors, such as age, sex, baseline risk from other CVD risk factors, and severity of disease. Survival is generally higher for patients with angina [11,12] than for those after myocardial infarction [12, 13] or heart failure [14,15]. Therefore, all these aspects sustain necessity to provide smoking cessation as precociously as possible in all smokers, whether smoking related diseases developed or not, but especially in those smokers at cardiovascular risk.

2 Problem formulation

2.1 Work hypothesis
Cardiovascular co-morbidity is often encountered at smokers hospitalized for respiratory disorders, especially COPD. Up to 50% of chronic smokers develop COPD and 80% to 90% of COPD mortality is caused by tobacco smoking. Worldwide, COPD is currently the fifth most common cause of death, and this trend is ascendant [3].

COPD is a systemic disease. That means that it causes a range of extra pulmonary symptoms, to include cardiac, muscular, bone related, psychological, and social ones. These associations are mediated by the pronounced systemic inflammation and biologic activation described in COPD [4]. Also, other chronic respiratory conditions have been described to add cardiovascular risk [16].

Structured smoking cessation treatment interventions have been shown to improve smoking cessation rates when initiated in hospitalized cardiac patients [17], while in patients diagnosed with smoking related respiratory diseases poor smoking cessation rates have been registered. Smoking cessation success rates was higher in smokers hospitalized for respiratory diseases, if concomitant cardio-vascular involvement existed [16].

Based on current literature review, the beneficial effects of quitting smoking are more obvious on pulmonary and cardiovascular function improvement. These effects appear within months after quitting and become sustainable with long-term abstinence [18].

It is expectable in joint respiratory and cardiovascular comorbidities, mortality risk increases considerably, thus stronger efforts to provide smoking cessation in this category of patients appear as legitimate. In chronic smokers, it is not at all uncommon to find respiratory and cardiovascular associated diseases and impact of this „neighbourhood” on smoking cessation outcomes deserves a more careful approach.

Patients already diagnosed with a respiratory disease, if not yet even contemplating the idea of cessation, become more aware of the need to stop smoking when another health risk, in this case, a cardiovascular disease is arising. As such patients become more vulnerable, we took into consideration hypothesis that motivation towards cessation should be stronger when cardiovascular risk adds to previous chronic respiratory condition. Thus, they should become more motivated to quit smoking and prompt, adequate intervention should be more successful.

Our study included smoking patients with unique respiratory vs. double respiratory and cardiovascular disease to receive counseling +/- pharmacological smoking cessation therapy. The end point was abstinence rates at 12 months follow-up in the respiratory diseases with vs without cardiovascular comorbidity. Impact of associated cardiovascular risk on cessation outcomes in respiratory ill smokers has been evaluated to design a personalized smoking cessation approach for such subjects.

2.2 Material
We conducted a study on 218 smoking adult patients with respiratory disorders divided in two groups: with and without cardiovascular co-morbidity.
To include patients in this study, we used the following criteria:
- current smoker, >10 cigarettes/day in the past 12 months
- stable chronic respiratory disease such as chronic bronchitis, COPD, asthma and lung cancer
- previous unassisted quit smoking attempts
- compliance to 12 months follow-up assessment either by office visit, either by telephone visit

Exclusion criteria were:
- never or former smokers with chronic respiratory disorders
- current smokers with cardiovascular disease and normal respiratory status
- unstable conditions/active diseases other than cardiovascular
- pregnancy
- participation in previous smoking cessation programs
- lost in follow up patients

2.3 Method
All 218 patients included in the study were assessed:
1. *Smoking status* by a validated questionnaire to determine:
   - chronic tobacco consumption (the number of packs-year = nr of years of smoking x average nr. of cigarettes smoked daily),
   - recent tobacco consumption (daily cigarettes consumption in the past 12 months),
   - nicotine dependence score, as established by Fagerstrom nicotine dependence test
   - previous quit attempts history,
2. Evidence of the chronic respiratory condition, such as asthma, COPD, lung cancer, chronic bronchitis, based on clinical, radiological, functional, bronchoscopic +/- histological data, as registered in medical records in our center.
3. Any cardiovascular chronic condition (coronary artery disease, stroke, peripheral vascular disease, congestive heart failure, chronic heart disease) as registered in patient’s medical record or any cardiovascular event that ever required hospital admission and was certified as ongoing by patient’s G.P.

Based on cardiovascular condition findings we divided subjects into two groups:
- Group 1: Smokers with chronic respiratory and cardiovascular disease
- Group 2: Smokers with chronic respiratory disease

Smokers in both Group 1 and Group 2 were given brief advice to quit smoking (3-5 minutes short advice to quit smoking argued with strong medical information about harmful effects of smoking and health benefits of stopping tobacco use). In the same time, all patients were asked to answer a validated smoking cessation motivational interview (SCMI) - see Fig.1.

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
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<tbody>
<tr>
<td>1. Do you want to give up smoking now?</td>
<td></td>
</tr>
<tr>
<td>2. Do you have health concerns in relation to your ongoing diseases?</td>
<td></td>
</tr>
<tr>
<td>3. If answering yes to question 2, which is your major health concern?</td>
<td>a) Respiratory</td>
</tr>
<tr>
<td></td>
<td>b) Cardiovascular</td>
</tr>
<tr>
<td>4. Do you feel that smoking will affect your performance?</td>
<td>a) Respiratory</td>
</tr>
<tr>
<td></td>
<td>b) Cardiovascular</td>
</tr>
<tr>
<td></td>
<td>c) Both</td>
</tr>
<tr>
<td></td>
<td>d) None of these situations above</td>
</tr>
<tr>
<td>5. Do you agree to receive smoking cessation pharmacological therapy?</td>
<td></td>
</tr>
<tr>
<td>6. If answering yes to question 5, is it due to:</td>
<td>a) Respiratory disease</td>
</tr>
<tr>
<td></td>
<td>b) Cardiovascular disease</td>
</tr>
<tr>
<td></td>
<td>c) Both</td>
</tr>
<tr>
<td></td>
<td>d) None of these situations above ( in this case, please give the reason)</td>
</tr>
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Fig. 1: Smoking cessation motivational interview

Based on SCMI answers and declared willingness to stop smoking, subjects were stratified into 4 subgroups:
- Group 1A: Smokers with chronic respiratory and cardiovascular disease who received smoking cessation pharmacological therapy + counseling
- Group 1B Smokers with chronic respiratory and cardiovascular disease who received only smoking cessation counseling
- Group 2A: Smokers with chronic respiratory disease who received smoking cessation pharmacological therapy + counseling
- Group 2B: Smokers with chronic respiratory disease who received only smoking cessation counseling.

Standard 3 months smoking cessation program was structured in 4-6 sessions to provide smokers with cognitive-behavioral smoking cessation counseling +/- medication upon request - as 12 weeks varenicline daily (0.5 mg in days 1-3, 0.5 mg x 2 in days 4-7 and 1 mg x 2 till end of cure).

Smoking status was assessed by standard initial and follow-up questionnaire at 0, 2, 4, 8, 12 treatment weeks and at 12 months follow-up visit when information collected either by phone, either by face to face interview. Smoking abstinence, defined as “0-5 cigarettes daily smoking patient with 0-6 ppm carbon monoxide levels in exhaled air, at successive follow-up visits, including 12 months after quitting smoking” [19] was both recorded in medical files and validated by carbon monoxide determination in exhaled air (Fig.2).

Fig.2 Determination of carbon monoxide in exhaled air

Compliance rates to study assessments were measured at 2, 8, 12 and 52 weeks follow-up visits. Special consideration was given to impact of cardiovascular risk on patients’ decision to receive smoking cessation pharmacological therapy and on their reasons to quit as described by SCMI.

3 Problem solutions

3.1 Results

Study population profile at baseline is shown in Table 1.

Table 1: Study population characteristics at baseline

As one can see in Table 1, data are in favor of high risk of cardiovascular co-morbidity in a population of smokers with chronic respiratory conditions: 49.5% (108/218). Data in Table 1 converge to such increased risk due to high tobacco consumption (except asthmatics, 87.2% study subjects smoked over 25 packs-years). Severe nicotine dependence (Fagerstrom score > 7) was revealed in 62.8% of study population.

Study subgroups stratification according to treatment options and their compliance to treatment visits can be found in Fig.3.

Smoking cessation rates were higher in both subgroups at cardiovascular risk, either with or without pharmacological therapy, compared to respiratory disorders alone subgroups. Abstinence rates at 12 weeks end of therapy and 12 months follow-up can be seen in Fig.4.

**3.2 Discussions**

There is strong evidence on beneficial effect of quitting smoking and smoking cessation is recommended by all guidelines as efficient when screening smokers for disease occurrence. As previous data have found, cardiovascular co-morbidity is often encountered in COPD hospitalised patients and determines a high 40% quit smoking rate [16]. Therefore, we have studied impact of cardiovascular co-morbidity on efficacy of stopping smoking in smokers diagnosed with respiratory disorders.

As our results show, approximately half of respiratory disease smokers (49%) associate cardiovascular disease in the practice of a respiratory disease clinic. This is linked with high, over 25 packs-years tobacco consumption in 87.2% of subjects, increased past 12 months cigarettes consumption in 50.4% of cases and severe nicotine dependence in 62.8%. Usually, hard-core smokers alike find difficult to give up smoking, especially if never received any expert smoking cessation advice, and this is how, after years of hard smoking, they become seriously ill, with many co-morbidities.

It is difficult to understand why, even if 68.3% of study subjects have an over 5 years history of their respiratory condition, yet none ever received smoking cessation advice from their G.P.-s. It seems that no matter how convincing data are available about the need to deliver brief advice and routinely identify smokers to quit, in the real life, most G.P.-s do not apply these rules.

On the other hand, when first time counseled to cease smoking, smokers’ compliance to therapy is higher in our experience, how much more so in smokers with co-morbidities [16]. Opportunity to discuss in this manner about his smoking habit with a doctor induces more often a smoker’s decision to receive pharmacological therapy to stop smoking, especially in more vulnerable co-morbid conditions.

Motivational interview interpretation in our study showed smokers with both cardiovascular and respiratory disease are more disposed to use medication for the purpose of smoking cessation (32% vs. 20% in the respiratory disease alone group). When asked if cardiovascular risk pushed their decision towards cessation, 74% of study subjects at cardiovascular risk answered “yes”.

Data about compliance rates to study visits in Fig. 3b sustain initial motivational status of study subjects towards cessation. Indeed, smokers with both conditions have attended more visits in both subgroups 1A and 1B.

Lastly, abstinence rates at both 12 weeks end of treatment visit and 12 months follow-up proved superior in the group of patients at risk of cardiovascular co-morbidity. If at 3 months end of therapy, abstinence in the medication subgroups was not significantly different (40.3% in subgroup 1A vs. 39.5% in subgroup 2 A), at 12 months follow-up this difference was evident from 25% in subgroup 1A to 18.6% in subgroup 2A. When counseling alone provided, similar situation was shown at 3 months end of therapy (38.8% in subgroup 1B vs. 37.2% in subgroup 2B), but in long term follow-up, the difference maintained non significant as 19.4% abstinence rate in subgroup 1B was found vs. 17.9% in subgroup 2B.
4 Conclusions

Our findings suggest presence of cardiovascular risk in chronic respiratory disease smokers represents a crucial point towards cessation. We believe routinely screening cardiovascular risk in current respiratory diseases practice would increase compliance to smoking cessation therapy. Also, based on study results, we strongly recommend personalized medical and psychological quit smoking approach of smokers with chronic respiratory conditions and concomitant cardiovascular co-morbidity. By adding short motivational interview to smoking cessation advice, we raised awareness of individuals on unperceived health risks and increased efficacy of smoking cessation therapy.

References