Aerobic Exercise Facilitate Vaping and Smoking Cessation

Subjects: Sport Sciences

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Cigarette smokers try to quit using several strategies including electronic cigarette use (vaping). An alternative, easy and cheap method is exercise. However, little is known about the efficacy of aerobic exercise (AE) to augment smoking and vaping cessation. One such potential alternative smoking cessation (SC) intervention is aerobic exercise. Exercise interventions are categorised as, e.g., aerobic, strengthening or relaxation exercises. Exercise is easy to access and cheap and therefore one may consider exercise as a viable intervention to facilitate SC, particularly via the reduction in nicotine withdrawal symptoms and cigarette craving

Keywords: aerobic exercise ; rehabilitation ; smoking cessation ; vaping cessation ; exercise physiology ; systematic review ; meta-analysis

1. Introduction

Smoking is considered the main risk factor for the development of preventable diseases such as cancers, cardiovascular diseases and respiratory disorders, including chronic obstructive pulmonary disease (COPD), and globally seven million deaths per year are attributable to smoking [1]. Smoking cessation (SC) reduces the risk of hospitalization due to chronic conditions, such as COPD, and is associated with significant life extensions [2][3]. As the annual death rate attributable to smoking is expected to increase within the next decades, the World Health Organization started calling upon governments and health institutes to develop anti-smoking regulations and interventions to further promote SC [1].

Although approximately 40% of smokers make at least one quit attempt annually [4], only fewer than 5% succeed [5]. Electronic-cigarette use (vaping) is promoted as a harmless and safe alternative to cigarette smoking [6] and uptake of vaping has been reported to be associated with higher rates of SC [7][8]. Vaping may, however, not be as harmless as originally thought and has been reported to cause similar detrimental effects on lung and cardiovascular function as smoking [9][10]. Such harmful effects may well contribute to the reportedly 33% of vapers that are willing to visit a vaping cessation service if available in their neighbourhood [11].

Beside vaping, SC interventions vary from pharmacotherapies including nicotine replacement therapy and SC counselling [12] to meditation and yoga programmes [13]. However, the success of these interventions is influenced by many factors such as the dose, type and duration of medication, intervention or counselling, motivational skills of SC advisors, follow-up periods, smokers' adherence, duration of smoking and number of cigarettes one used to smoke per day. Indeed, the long-term effectiveness of these interventions remains ambiguous [14][15][16][17] and it is essential to keep looking for other interventions and assess their effectiveness.

One such potential alternative SC intervention is aerobic exercise. Exercise interventions are categorised as, e.g., aerobic, strengthening or relaxation exercises. As vaping and smoking particularly affect the cardiovascular and respiratory systems researchers consider here the impact of aerobic exercise training on the success of vaping and smoking cessation. In addition, it has been shown that aerobic exercise improves mood, well-being, and alleviates anxiety and depression, thereby contributing to the often-reported improvement in the quality of life [18][19][20][21][22]. Perhaps even more important is that exercise is easy to access and cheap and therefore one may consider exercise as a viable intervention to facilitate SC, particularly via the reduction in nicotine withdrawal symptoms and cigarette craving [23][24].

The mechanism by which aerobic exercise may enhance SC is not fully clear, but a number of mechanisms have been postulated, including raised endorphins, distraction and increased self-efficacy. It is known for example, that aerobic exercise induces an increase in plasma β-endorphins [25] that is dependent on the intensity and duration of the exercise performed [26]. The exercise-induced rise in β-endorphin levels may be significant as it has been found that higher levels were associated with fewer smoking relapses after cessation [27]. Additional mechanisms whereby aerobic exercise may

facilitate SC are (1) increased proprioceptive input due to larger and more frequent movements that could distract smokers from cigarette craving [28] and (2) improved image self-efficacy [29]. Despite these potential mechanisms, the long-term benefits of exercise for smoking- and vaping- cessation are not clear.

2. Design of the Exercise Studies and Verification of Smoking Cessation

Comparator groups received the same intervention as the exercise group, and consisted of face-to-face consultation [30][31][32][33][34][35][36][37][38][39][40], telephone counselling [33], behavioural treatment [39][41], nicotine gum [41][42], nicotine patch [39], inhalers [42], cognitive therapy [39], or combination of more than one treatment. In the trials included in the meta-analysis, smoking cessation was confirmed by measurement of the expired CO [31][32][33][34][35][37][38][39][40][41][42], saliva cotinine [32][36][37][38][39] or plasma thiocyanate [30] concentrations.

3. Exercise Interventions Do Not Enhance Smoking Cessation

When studying the benefits of exercise interventions for smoking cessation it is important to consider whether that is influenced by the frequency, intensity, time and type (FITT) of exercise [43][44][45].

Only two high quality trials reported that aerobic exercise intervention resulted in higher number of long-term successful quitters compared to other interventions [36][38]. These trials used 3 vigorous-intensity exercise sessions a week for 12–15 weeks. This is, however, an equivocal observation as three other high-quality trials with similar intensity, frequency and duration of exercise did not report a significant improvement in SC after aerobic exercise interventions [34][37][41]. As the effectiveness of exercise programs is highly dependent on adherence [46], it is possible that the benefits of exercise in two trials [36][38] and no benefits in another trial is related to the high adherence (68.7% and 88%, respectively), or low (55%) adherence [41] to the exercise interventions.

4. Exercise during Smoking Cessation Interventions Enhances VO_{2max} and/or VO_{2peak}

Even if exercise does not benefit SC, there are substantial other benefits of exercise, such as the negative association with the prevalence of lung carcinoma in smokers and quitters [47] and a significant reduction in the mortality of smokers [48]. In addition, exercise during smoking cessation interventions led to a significant improvement in VO_{2max} and/or VO_{2peak} [32][33][34][35][36][37][38][39]. Improvements in VO_{2max} indicate improved aerobic exercise capacity and may also contribute to a reduction in the development of numerous clinical conditions and morbidities [49]. Besides these benefits for exercise capacity and diminishing the risk of future morbidity, there are also other physiological and psychological benefits to exercise as an adjunct to SC [50][51]. For example, exercise led to a reduction in withdrawal symptoms and improvement in psychological wellbeing, such as reduction in anxiety, depression and mood-swings [32][33][40]. Thus, even though exercise did not enhance the success rate of smoking cessation it nevertheless has significant beneficial effects for people seeking to stop smoking.

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