

# Lifestyle, diet and e-cigarettes in chronic obstructive pulmonary diseases

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Successful packages of interventions for preventing non-communicable diseases are proposed in the last years. Tobacco industry has been started during the last 10 years to focus more on new strategies and to promote more e-cigarettes and heat-not-burn (HNB) tobacco as before. The question is whether we are prepared to face this change of priorities of the tobacco industry in case of non-communicable diseases. This new offer imposed another type of indications for lifestyle, diet and quitting smoking in relation to the new tobacco products or e-cigarettes. The articles looking for these possible associations are rare.

There are community-based interventions (1) for cancer and tobacco control and also for the prevention of cardiovascular diseases, diabetes and hypertension, but it seems that we need more. Toxins, stress, different radiations, smoking and all environmental chemical substances can influence epigenetics and lead to harmful protein development (2).

Since 90% of the risk of non-communicable diseases could be eliminated by adopting a healthy lifestyle, it can be considered that the base for prevention should be the following: managing normal weight, by adopting healthy eating patterns; practicing physical activity; managing normal metabolic blood parameters, such as low-density lipoprotein (LDL) cholesterol, glycaemia and healthy blood pressure. Meanwhile, nonsmoking status is mandatory for a healthy lifestyle.

As designed by the World Health Organization (WHO), the world's biggest health risk factor of the environment (other than passive smoking), pollution influences exacerbations in chronic obstructive pulmonary disease (COPD). Many evidences have been studied in order to find a diet that could be protective for pollution effects. Recently, a large review evidenced the protective antioxidative effect correlated with the intake of carotenoids, vitamin E and vitamin D. But for smokers, special care in the intake of carotenoids is needed, as smoking increases oxidative stress; previously, it has

been shown in the CARET study (beta-carotene efficacy trial) and alpha-tocopherol beta-carotene (ATBC) research (ATBC cancer prevention) (3).

In respiratory diseases, adopting a Mediterranean diet, currently recommended in American diet guidelines 2015–2020 (4), will be beneficial for smokers, but not proofed benefits in air pollution (3).

The role of fruits and vegetables in preventing COPD has been proved in a very large, populational study on smokers, nonsmokers and ex-smokers, showing an important decrease in COPD risk after the consumption of fruits and vegetables. Forty percent decrease in COPD risk is associated with five servings per day of the consumption of fruits and vegetables and 34% with two servings per day for smokers and ex-smokers, but not for nonsmokers. In addition, for one serving increase daily, the decreased risk associated is 8% for current smokers (95% CI 4–11%) and 4% for ex-smokers (95% CI 0–7%) (5).

Statements concerning e-cigarettes are coming from different associations. It is clear that the effect on long term of e-cigarettes is less studied; however, if we are looking at the American Cancer Society statement, it discourages the use of e-cigarettes for quitting smoking (6) and recommends the support of clinicians and the use of only Food and Drug Administration (FDA)-approved cessation aids.

Special warnings for second-hand e-cigarette smoking have been released by the US surgeon and the National Academies of Science, Engineering and Medicine (7). An important report, a consensus created in January 2018 by National Academies of Science, Engineering and Medicine after reviewing 800 studies, is emphasising a very strong message about health risks caused by the usage of e-cigarettes. A lot of dangerous chemical substances such as acrolein, acetaldehyde and formaldehyde are produced by e-cigarettes, leading to lung diseases and cardiovascular diseases (8). Another very dangerous substance is acrolein, which is used as herbicide.

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Acrolein could be responsible for COPD, asthma and lung cancer (9).

The list of effects is longer as a result of countless studies.

The impact of diet on smokers with different chronic respiratory diseases is also important. In managing COPD, many dietary options have been studied in order to find the best model. Higher intake of fruits and vegetables and vitamin C is associated with a slower forced expiratory volume in 1 second (FEV<sub>1</sub>) decline rate (10). Better FEV<sub>1</sub> can be seen in an adequate intake of vitamin D, vitamin A, magnesium and folate. Fibres could also play an important role in maintaining a healthy microbiota and acting against inflammations. The intake of high omega 3 polyunsaturated fatty acid (PUFA) is accompanying slower decline in FEV<sub>1</sub> and good average FEV<sub>1</sub> (10). For persons quitting smoking, higher the intake of nutrients, higher the control of FEV<sub>1</sub> decline (10). For older adults exposed to cigarette smoke, all these intakes of antioxidant micronutrients could be associated with the modulation of lung function decline.

A lot of marketing efforts from tobacco industry are directed towards associating e-cigarettes with words related to healthy foods that are enhancing previous messages and promoting e-cigarettes as less harmful option versus traditional cigarettes as well as misleading people (11). In addition, a strange message that e-cigarettes deliver vitamins has been circulating (12) and social media is full of messages associating vaping with healthy eating habits such as salads (13). Juice fruit flavours are preferred by teenagers, giving also a subliminal message linking healthiness, pleasant aromas and e-cigarettes (13).

Quitting smoking is a milestone for smokers. The scientific community is divided regarding the opinion of using e-cigarettes as a smoking cessation aid. E-cigarette is used as an attempt for smokers to quit or reduce tobacco smoking and for ex-smokers to avoid relapsing. For smokers, depression, a poor self-rated health, and being on a diet were positively associated with the use of e-cigarettes; metabolic syndrome was negatively associated with the use of e-cigarettes only when not on a diet (14). For ex-smokers, having a cardiovascular history and a longer time elapsed since tobacco cessation was negatively associated with the use of e-cigarettes (15).

Both at population level and in separate subgroup analysis, vaping was associated with increased smoking cessation rate (16). Others authors describe e-cigarettes to be low effective as an independent component of the smoking cessation programme. They do not recommend e-cigarettes as an independent method for the smoking cessation, because they have low clinical efficacy and high economic expenses (17). Policymakers need to revise very carefully all data in order to implement right tobacco control strategies (17).

When we evaluate the benefits of quitting smoking, we have to take into account gender differences in dietary intakes and some others regarding smoking patterns in all that means obstructive chronic respiratory diseases (18).

In conclusion, the recommendation is to restrict all electronic smoking devices until more data will be available, concerning safety. In addition, strict regulations and procedures, like for medicines or tobacco products, are proposed (18). The quality of food also matters for all chronic respiratory patients. For obstructive respiratory diseases, at this moment, more studies are ongoing. High intake of fruits and vegetable, leading to lower risk of COPD development, is proved in current and ex-smokers, not also in previous smokers (5). Mediterranean diet should be indicated as a healthy dietary model, associated with better asthma and COPD protection. We can improve, by better diet quality, the asthma symptoms over time in never smokers, independent of the body mass index (19).

Starting from the current evidence suggesting a positive impact of agriculture-based food security programmes on dietary indicators in low and lower-middle-income countries (20), we need urgent new strategies taking into account also the impact of e-cigarettes on our lifestyle. For a healthy ageing, nothing more than a healthy lifestyle could be recommended. High intake of fruits and vegetables, good-quality proteins, low-fat dairies, unsaturated fats and cereals with physical activity and smoking cessation are essential for a healthy long life (21).

## Conflicts of interest

The authors declare that they have no conflicts of interest related to this article.

## References

1. Mappalakayil P, Kannan S, Ambali Parambil N. Community based interventions for health promotion and disease prevention in non-communicable diseases: a narrative review. *Journal of Education and Health Promotion*. 2018;7: 141.
2. Lacagnina S. Lifestyle medicine: a revolution or a revelation? Editorial. *American Journal of Lifestyle Medicine*. 2018;12: 360–362.
3. Zhai T, Li S, Hei W, Potential micronutrients and phytochemicals against the pathogenesis of COPD and lung cancer. *Nutrients*, 2018;10(7): pii.E813.
4. Dietary guidelines. 2015. Available from: <https://health.gov/dietaryguidelines/2015/guidelines>.
5. Kaluza J, Larsson SC, Orsini N, Linden A, Wolk A. Fruit and vegetable consumption and risk of COPD: a prospective cohort study of men. *Thorax*. 2017;72: 500–509.

6. American Cancer Society Position Statement on Electronic Cigarettes. 15 February 2018. Available from: p1-3-<https://www.cancer.org/health/stay-away-from-tobacco/e-cigarette-position-statement>.
7. NAM Report. Available from: [https://e-cigarettes.surgeongeneral.gov/documents/2016\\_SGR\\_Full\\_Report\\_non-508.pdf](https://e-cigarettes.surgeongeneral.gov/documents/2016_SGR_Full_Report_non-508.pdf).
8. Ogunwale MA, Li M, Ramakrishnam Raju MV, Chen Y, Nantz MH, Conklin DJ, et al. Aldehyde detection in electronic cigarette aerosols. *ACS Omega* 2017;2(3): 1207–1214. doi:10.1021/acsomega.6b00489.
9. Bein K, Leikauf GD. Acrolein – a pulmonary hazard. *Molecular Nutrition and Food Research*. 2011;55(9): 1342–1360.
10. Bentley AR, Kritchevsky SB, Harris TB, Holvoet P, Jensen RL, Newman AB, et al. Dietary antioxidants and forced expiratory volume in 1 s decline: the health, aging and body composition study. *European Respiratory Journal*. 2012;39: 979–984.
11. Basanez T, Majmundar A, Cruz BT, Unger JB. Vaping associated with healthy food words: a content analysis of Twitter. *Addictive Behaviors Reports*. 2018;8: 147–153.
12. Basanez T, Majmundar A, Cruz NT, Allem JP, Unger JB. E-cigarettes are being marketed as “vitamin delivery” devices. *AJPH*. 2019;2: 194–196.
13. Morean ME, Butler ER, Bold KW, Kong G, Camenga DR, Cavallo DA, et al. Preferring more e-cigarette flavors is associated with e cigarette use frequency among adolescents but not adults. *PLoS One*. 2018;13(1): e0189015.
14. Lequy E, Wiernik E, Hourani I, Cyr D, Nadif R, Lemogne C, et al. The use of electronic cigarette by smokers and ex-smokers is associated with a poor perceived health status in the population-based Constances cohort. *European Respiratory Journal*. 2018;52:Suppl. 62: OA5221.
15. Zhu Shu H, Zhuang YL, Wong S, Cummins SE, Tedeschi GJ. E-cigarette use and associated changes in population smoking cessation: evidence from US current population surveys. *BMJ*. 2017;358: j3262.
16. Dmytriiev K, Mostovoy Y, Slepchenko N, Tsymbaliuk N, Sidorov A. Role of e-cigarettes in the smoking cessation. *European Respiratory Journal*. 2018;52: PA1726.
17. Yong HH, Hitchman SC, Cummings KM, Borland R, Gravely SML, McNeill A, et al. Does the regulatory environment for e-cigarettes influence the effectiveness of e-cigarettes for smoking cessation? Longitudinal findings from the ITC Four Country Survey. *Nicotine & Tobacco Research*. 2017;19(11): 1268–1276.
18. Schraufnagel DE, Blasi F, Drummond MB, Lam DC, Latif E, Rosen MJ, et al. Electronic cigarettes. A position statement of the forum of international respiratory societies. *American Journal of Respiratory and Critical Care Medicine*. 2014;190: 611–618.
19. Li Z, Kesse-Guyot E, Dumas O, Garcia-Aymerich J, Leynaert B, Pison C, et al. Longitudinal study of diet quality and change in asthma symptoms in adults, according to smoking status. *The British Journal of Nutrition*. 2017;117: 562–571.
20. Pullar J, Allen L, Townsend N, Williams J, Foster C, Roberts N, et al. The impact of poverty reduction and development interventions on non-communicable diseases and their behavioural risk factors in low and lower-middle income countries: a systematic review. *PLoS One*. 2018;13: e0193378.
21. Atallah N, Adjibade M, Lelong H, Hercberg S, Galan P, Assmann KE, et al. How healthy lifestyle factors at midlife relate to healthy aging. *Nutrients*. 2018;10: 854.