Marijuana smoking and the risk of developing COPD, lung cancer, and/or chronic respiratory symptoms: a systematic review

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Abstract

Objective: conduct a systematic review of the existing evidence on marijuana use and its association, or the absence of an association, with an increased risk of developing COPD, lung cancer, and/or chronic respiratory symptoms.

Methods: The following databases were searched for the terms of marijuana smoking, COPD, lung cancer, and chronic respiratory symptoms: MEDLINE (PubMed/OvidSP), the Cochrane Controlled Trials Register and Databases of Systematic Reviews, PsychINFO, the Database of Abstracts of Reviews of Effects, and Google Scholar. The quality of systematic reviews was evaluated using the AMSTAR criteria; cohort, case-control, and cross-sectional studies were evaluated based upon the Newcastle-Ottawa Quality Assessment Scale (NOS). The overall quality of the evidence for each outcome was determined by the GRADE methodology.

Results: Overall, there is very low quality evidence that assesses for an association between marijuana smoking and an increased risk of developing lung cancer, COPD, and/or chronic respiratory symptoms. There were no conclusive findings for lung cancer use and the risk of developing lung cancer, COPD, and/or chronic respiratory symptoms is insufficient to confidently state that marijuana use is associated, either positively or negatively, with any of these chronic pulmonary conditions.

Introduction

Cannabis is a generic term used to represent various psychopharmacological preparations of the Cannabis sativa plant. Globally, cannabis is the most widely trafficked and abused illicit drug. "Marijuana" refers to the utilization of the Cannabis sativa leaves for smoking and it is the most commonly abused illicit drug in the United States. Historically, there is an array of mental and/or physical effects of marijuana use has dominated research efforts; however, the physical effects of cannabis use on the lungs and their function have recently gained more attention in an effort to address the steady increase in cannabis use. Several studies have attempted to demonstrate biologic plausibility as well as associations between chronic marijuana use and large airway obstruction. "Field characterization" of the bronchial epithelium along with other histological changes, chronic bronchitis, wheezing, and chest tightness.

This study has the potential to impact public policy regarding continued legalization of marijuana as well as patient care by documenting whether there is sufficient evidence to determine the effects of marijuana use on the risk of developing COPD, lung cancer, and/or chronic respiratory symptoms.

Methods

Inclusion Criteria: Randomized controlled trials (RCTs), prospective or retrospective cohort studies, case-control studies, and cross-sectional studies, addressing the key questions, and written in English. The studies had to specify an address to address marijuana smoking and at least one of the three outcomes of interest: COPD, lung cancer, or chronic respiratory symptoms.

Exclusion Criteria: Case reports or case series, studies not based upon human research, or studies that failed to address the key questions pertaining to the three outcomes of interest. This systematic review also excluded studies that evaluated changes in pulmonary function tests (PFTs) if they failed to address clinically significant outcomes (i.e., COPD).

Database Search Strategy: The following databases were searched through September 7th, 2016: MEDLINE (PubMed/OvidSP), the Cochrane Controlled Trials Register, the Cochrane Databases of Systematic Reviews, PsychINFO, the Database of Abstracts of Reviews of Effects, and Google Scholar. The search results were limited to titles and abstracts with the keywords of marijuana, cannabis, smoking, and smoking-related outcomes. The search was limited to English-language articles.

Data Synthesis and Analysis: A substantial amount of heterogeneity with respect to measurements and classification of exposures, groups, outcomes, and statistical analysis between studies across all outcomes assessed in this systematic review precluded quantitative synthesis (i.e., pooling of data and statistical analysis of the available evidence).

Results

Search Results: The electronic database searches and secondary search checks yielded a total of 845 articles; 106 articles were removed after being identified as duplicates.

After adjusting for tobacco use, the remaining 239 articles underwent abstract screening to exclude obviously irrelevant studies, resulting in the exclusion of 60 articles.

The remaining 129 articles were examined after adjusting for the key questions/outcomes and the inclusion criteria of this systematic review. 22 articles were excluded due to failure to address the key questions/outcomes or due to having a case-control or case-series design.

Thus, 17 unique studies were determined to meet the inclusion criteria and underwent qualitative analysis in the present systematic review. The-composition of the 17 included studies is as follows: systematic reviews (2), cohort studies (5), case-control studies (4), cross-sectional studies (4).

Discussion and Conclusion

The hypothesis being examined by this systematic review stated that the literature would fail to demonstrate sufficient evidence to determine that smoking marijuana is associated with an increased risk of developing lung cancer, COPD, and/or chronic respiratory symptoms. After assessing the quality of individual studies as well as the totality of evidence for each of these three outcomes, there is insufficient evidence to either reject or accept the hypothesis that marijuana use increases the risk of developing lung cancer, COPD, and/or chronic respiratory symptoms. In addition to the overall low quality of the studies examined, it would not be reasonable to draw conclusions based on evidence with such a significant amount of bias. Despite this acknowledgement, the individual studies found to be of a "higher-level" of evidence for each outcome will be discussed in further detail below.

As previously mentioned, a substantial amount of heterogeneity between studies across all outcomes was identified in this systematic review. The overall quality of evidence of very low quality due to significant methodological weaknesses within the studies included in this systematic review. Thus, there is insufficient evidence in the current literature to make a definitive statement regarding this possible association.

The aforementioned serious limitations led to downgrading the overall quality of evidence across all three outcomes that were examined by this systematic review. This has the potential to cause serious issues with regard to the degree of confidence with respect to the measured effects, especially for conditions with a longer clinical latency period such as lung cancer and COPD. An amount of studies may not have allowed sufficient "lag-time" for the development of these outcomes by either inadequate duration of follow up or determination of the upper limit age for inclusion. A case-control study of "good quality" aimed to determine the risk of lung cancer associated with smoking cannabis, but limited the study to participants > 55 years of age at the time of diagnosis. In the case of potential adverse lag time, multiple studies examining the risk of developing COPD in marijuana smokers stopped their assessments before the participants reached 55 years of age.

While the outcomes (lung cancer, COPD, and general respiratory symptoms) themselves were consistent between studies, the inclusion criteria of participant age as well as the duration of follow-up varied significantly between studies. This has the potential to cause serious issues with regard to the degree of confidence with respect to the measured effects, especially for conditions with a longer clinical latency period such as lung cancer and COPD. A significant amount of studies may not have allowed sufficient "lag-time" for the development of these outcomes by either inadequate duration of follow up or determination of the upper limit age for inclusion. A case-control study of "good quality" aimed to determine the risk of lung cancer associated with smoking cannabis, but limited the study to participants > 55 years of age at the time of diagnosis. In the case of potential adverse lag time, multiple studies examining the risk of developing COPD in marijuana smokers stopped their assessments before the participants reached 55 years of age.

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