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Smoking Cessation Interventions in Light Smokers: A Systematic Review[1,2]

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Abstract: Despite decreases in the prevalence of smoking, the number of low-rate smokers – commonly called light or intermittent smokers – is increasing. Any dose of tobacco can be hazardous to health. Research about this population is scarce and little is known about tobacco cessation interventions that focus on these groups. The aim of the present paper is to conduct a systematic review to describe research on interventions for light and intermittent smokers. Searches were conducted in PubMed, PsycInfo, SciELO and Pepsic. Search terms included: [light smoker, non-daily smoker, intermittent smoker; social smoking, occasional smoking, low-level smoking] AND [intervention studies, clinical trial and evaluation studies] AND [tobacco use cessation, tobacco use disorder]. Nine studies met the inclusion criteria. Successful interventions included counseling and pharmacotherapy such as brief intervention, health education, nicotine replacement, and varenicline. Interventions for light smokers are in the early stages of development. Future studies should test interventions specifically designed for low-rate smokers, develop dependence scales designed for low-rate smokers, and pursue epidemiologic studies to better profile light and intermittent smokers, especially in Brazil.
Keywords: Light Smoking; tobacco cessation; systematic review.

Intervenções de Cessação de Tabagismo em Fumantes Leves: Uma Revisão Sistemática

Resumo: Apesar da diminuição da prevalência de fumantes, o número de tabagistas de baixo consumo de cigarro tem aumentado, comumente denominados de fumantes leves ou intermitentes. É sabido que qualquer quantidade de consumo de tabaco pode trazer danos à saúde. A pesquisa sobre essa população é escassa e pouco se sabe sobre intervenções de cessação de tabagismo direcionadas a esses grupos. Dessa forma, o objetivo do presente estudo foi realizar uma revisão sistemática a fim de descrever estudos que apresentam intervenções para fumantes leves e intermitentes. As pesquisas foram conduzidas nas bases de dados PubMed, PsycInfo, SciELO e Pepsic. Palavras-chave incluíram: [light smoker, non-daily smoker, intermittent smoker; social smoking, occasional smoking, low-level smoking] AND [intervention studies, clinical trial and evaluation studies] AND [tobacco use cessation, tobacco use disorder]. Nove artigos preencheram os critérios de inclusão e foram analisados. Os resultados apontaram que intervenções bem-sucedidas incluíram aconselhamento e uso de medicamentos, tais como intervenção breve, tratamento de reposição de nicotina, Vareniclina, educação

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em saúde, entre outros. No entanto, intervenções ainda estão em estágio inicial. Destaca-se a necessidade de mais investigações sobre intervenções específicas para fumantes de baixo consumo, desenvolvimento de escalas de dependência exclusivas para esse grupo e estudos epidemiológicos para compreender quem são os fumantes leves e intermitentes, especialmente no Brasil.
Palavras-chave: Tabagismo leve; cessação tabágica; revisão sistemática.

Intervenciones para el Abandono del Tabaco en los Fumadores Ligeros:

Una Revisión Sistemática

Resumen: A pesar de la disminución de la prevalencia de fumadores, el número de tabaquistas de bajo consumo de cigarrillo ha aumentando, comúnmente llamados como fumadores ligeros o moderados. Se sabe que cualquier cantidad de consumo de tabaco puede ser peligroso para la salud. La investigación sobre esta población es escasa y poco se sabe acerca de las intervenciones para dejar de fumar que se centran en estos grupos. Por lo tanto, el objetivo de este estudio fue hacer una revisión sistemática para describir los estudios que presentan las intervenciones para los fumadores ligeros y moderados. Las investigaciones fueron hechas a partir de las siguientes bases de datos PubMed, PsycInfo, SciELO y Pepsic. Las palabras clave incluyeron: [light smoker, non-daily smoker, intermittent smoker; social smoking, occasional smoking, low-level smoking] AND [intervention studies, clinical trial and evaluation studies] AND [tobacco use cessation, tobacco use disorder]. Nueve artículos cumplieron los criterios de inclusión y fueron analizados. Los resultados mostraron que las intervenciones exitosas incluyeron consejos y uso de medicamentos, tales como intervención breve, tratamiento de reemplazo de nicotina, Vareniclina, educación para la salud, entre otros. Sin embargo, las intervenciones están en la etapa inicial. Enfatizamos la necesidad de más investigaciones sobre las intervenciones específicas para los fumadores de bajo consumo, el desarrollo de escalas de dependencia exclusivas para estos grupos y estudios epidemiológicos para comprender quiénes son los fumadores ligeros y moderados, especialmente en Brasil.
Palabras clave: Tabaquismo ligero; dejar de fumar; revisión sistemática..

Smoking is considered by the World Health Organization (WHO) to be the leading cause of preventable death in the world. About 1.2 billion people worldwide are smokers and about 15% of all deaths in developing countries are caused by tobacco. Furthermore, tobacco is directly related to more than 50 different diseases, such as heart disease, cancer and chronic obstructive respiratory diseases (World Health Organization [WHO], 2008).

Despite the decrease of heavy smoking rates, the number of smokers with low cigarette consumption has increased. According to the National Survey on Drug Use and Health (NSDUH) of United States, 44,5% of smokers smoke less than 10 cigarettes per day (cpd). It is estimated that a quarter to a third of adult smokers in the U.S. are non-daily smokers (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009). Low-rate smokers are becoming more prevalent in some countries in Europe, Asia and Latin America (WHO, 2008).

In Brazil, epidemiological studies focusing on low-rate smokers are still in early stages (Rocha et al., 2010). Based on a Brazilian household survey (PETab), among people aged 15 or over who smoke cigarettes, 16.2% smoke less than 5 cpd, 19.3% smoke between 5-9 cpd and 20.8% smoke 10-14 cpd. In other words, 56.3% of Brazilian smokers are low-level smokers, considering those who use 1-15 cpd as the cutoff. Moreover, 2.1% of current smokers do not smoke daily (Instituto Nacional do Câncer [INCA], 2010). A recent study in Minas Gerais supports with the PETab (2008) data; among 147 smokers at a center for hypertension and diabetes, 50% smoked less than 10 cigarettes per day (Cupertino et al., 2013).

Any dose of tobacco, however, can be harmful (WHO, 2008). Light and intermittent smokers have almost the same risk for heart disease as heavy smokers and the risk for lung cancer,

although lower, it is still significant (American Cancer Society, 2013). Light smoking is associated with respiratory tract infections, cataracts, problems with reproductive health, development of physical disability after injury and increased risk of all-cause mortality. Light smokers report lower quality of life in 8 dimensions of the SF-36 questionnaire (physical functioning, physical roles limitation, emotional roles limitation, social function, bodily pain, mental health, vitality and general health) (Schane, Ling & Glantz, 2010).

There is no consensus in the literature concerning the definition of light smoking. Researchers have defined light smoking as the consumption of less than a pack per day, less than 15 cpd, 10 or less cpd or 1-39 cigarettes per week (Husten, 2009). The term intermittent smoking has been used to describe patterns of non-daily smoking, while the term light smoking refers to low rates of daily cigarette consumption (Schane et al., 2010). Researchers have employed multiple descriptors to label these groups, including light smokers, occasional smokers, intermittent smokers and social smokers (Okuyemi et al., 2002).

As there is wide variety of terms to define smokers with low levels of cigarette consumption, we elected the term light smoker because according to Okyeymi (2002), it is the term most applicable to the wide variety of smokers with low levels of cigarette consumption. During this study we will refer to light smokers as any smoker who has a low level of consumption.

Some characteristics of light smokers have been described in the literature. Researchers demonstrated that young adults with higher socioeconomic levels and education are more likely to be light smokers. Even though young, light smokers typically start smoking later than heavy smokers and there are no significant differences related to gender (Okuyemi et al., 2002). In the United States, light smoking is more prevalent in specific populations, including African-American, Hispanics, Latinos and Asians, compared to Whites (Trinidad et al., 2009).

Light smokers make plans to quit or try to quit more often than heavy smokers and report lower rates of dependence and withdrawal. Many of them score very low, low or medium on dependence scales such as the The Fagerstrom Test for Nicotine Dependence (FTND) (Shiffman et al., 2012). However, they still have difficulty quitting, fail in their quit attempts, and relapse at rates comparable to heavy smokers (Tindle & Shiffman, 2011).

Despite these problems, light smokers are often excluded from tobacco cessation research. Light smokers do not consider themselves to be tobacco dependent, believe they do not suffer risk of diseases associated with smoking, and therefore do not seek help. In general, it is assumed that light smokers do not need help in cessation and are able to quit on their own. However, success rates associated with unaided quit attempts are extremely low-less than 10% (Shiffman, 2009).

At present, knowledge of cessation interventions for light smokers remains scarce, as light smoking remains poorly addressed in the national and international literature. The aim of the present study, therefore, is to systematically review the literature on tobacco cessation interventions conducted among light smokers.

Methods

This study is a systematic review of the literature – an evaluation using information from databases of scientific journals, which can generate important information on the quality and quantity of knowledge in areas of research (Witter, 2005).

The systematic review was conducted in 4 databases: PubMed, Psycinfo, SciELO and Pepsic. As there is no consensus in the literature about definitions of light smoking, we combined all of the known terms, including light smoker; non-daily smoker; intermittent smoker; social smoking; occasional smoking; low-level smoking using the Boolean operator OR. In the search on PubMed, we used the Medical Subject Heading (MeSH) terms developed by U.S. National Library of Medicine, which is used as vocabulary control method for abstracts in both MEDLINE and PubMed. The two sets of MeSH terms employed covered the research approach

(intervention study OR clinical trial OR evaluation study); and tobacco as the general area of research (tobacco use cessation OR tobacco use disorder). In MeSH term searches, we restricted searches to only those articles that addressed these topics as a main focus of the article. Finally, the search results for the 3 searches (light smoking, research approach, and tobacco) were crossed using the Boolean operator AND. We did not restrict the year of publication in our searches.

In order to increase the scope of the search, we included papers identified through the related citation function in PubMed, cited in the references of the papers that we found, and recommended by researchers from the Asssociation for the Treatment of Tobacco Use and Dependence (ATTUD), an association for U.S. researchers and clinicians (http://www.attud.org/).

Eligibility criteria for the review included (1) having light smokers in the study sample (2) focusing on tobacco cessation (3) presenting quantitative data on abstinence rates. The search resulted in 521 abstracts that were entered into a database using Endnote Web, accessed through the Journal "Portal CAPES". Evaluation of the abstracts yielded 26 duplicate papers and 469 that did not meet selection criteria, resulting in 26 abstracts that appeared to meet the primary focus of this review.

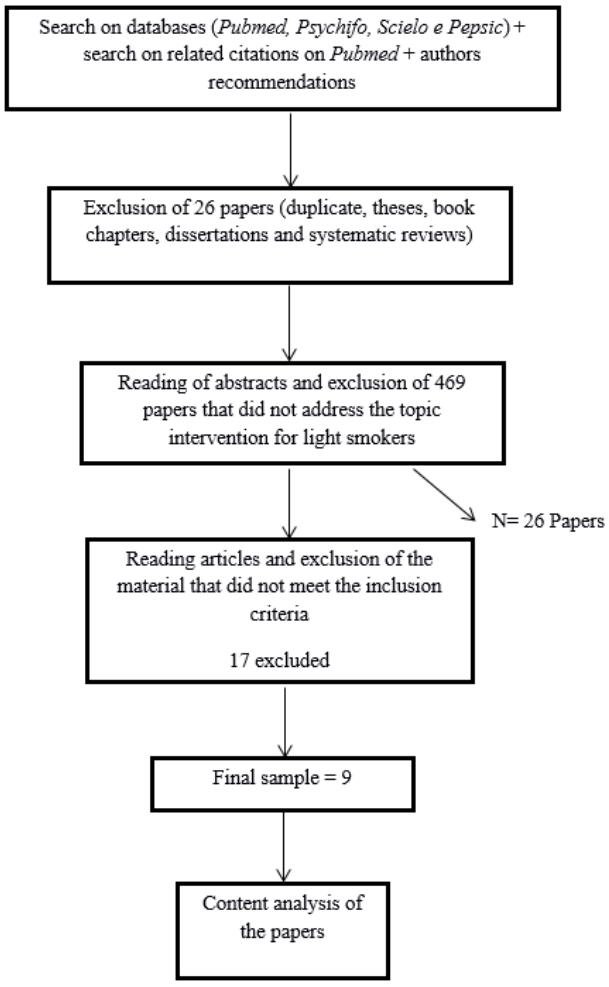

Figura 1: Performed procedures for the selection of the constituent materials of bibliometric analysis and content analysis

We evaluated the full text of these 26 articles, of which 9 met all criteria for inclusion. Thus, the final sample included nine articles, that were analyzed to identify the type and effectiveness of smoking cessation interventions. We categorized the articles according to five domains including citation information, type of population studied, the definition of light smokers used, intervention components and main findings.

Results

Citation information

This includes authors, year of publication, journal, language and country of study. The first study analyzed was published in 2005 by Saul Shifmman.

Thereafter, publications occurred sporadically, with only one publication in 2006, 2009 and 2010, indicating very little scientific productivity. There seems to be an increasing interest in the topic over the two most recent years, with three and two publications, respectively.

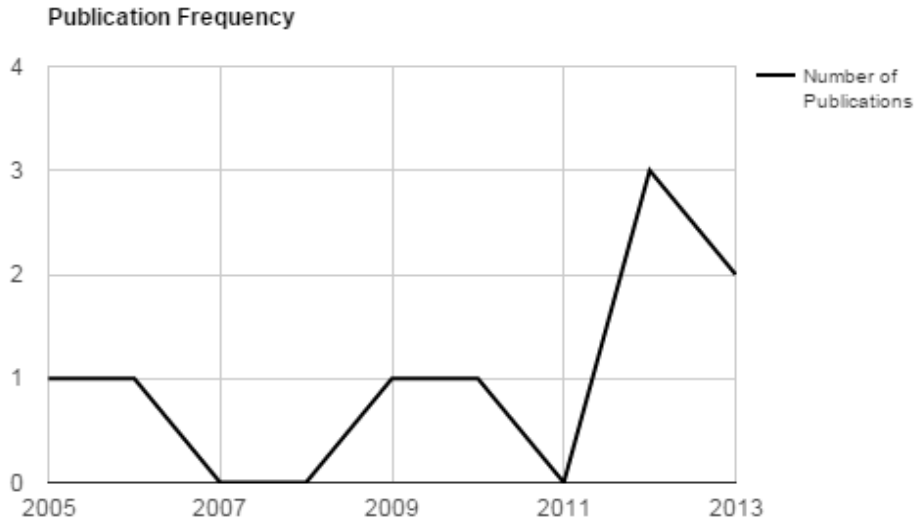

Figura 2: Publication Frequency.

Two journals published a majority of the articles, Journal of Substance Abuse Treatment and Nicotine and Tobacco Research, with two published studies each. Researchers from the United States published eight of the nine papers, and France the site for one study. All of the papers were published in English.

Sample

Five studies used light smokers as an inclusion criterion, while three made comparisons between heavy and light smokers, offering the same intervention for both groups. Just one article limited its

sample to non-daily smokers. Four study samples were limited to U.S. ethnic minorities such as Hispanics, Latinos or African Americans, due to the higher prevalence of light smoking in these groups (Trinidad et al., 2009).

Definition of light smoker

Studies employed no single definition of light smoker, and consequently differed in how they classified smokers. Five studies considered light smokers to be those who smoke less than 10 cigarettes per day (cpd), while two required smokers to use less than 15 cpd. One article classified as light smokers those who smoke 6-15 cpd, and one defined it as those who smoke 3-9 cpd. Hence, 15 cpd could be considered the upper limit of light smoking. Finally, one study limited their sample to non-daily smokers—defined as intermittent smokers.

Table 1. *Articles categorized by year, definition of light smoker and intervention*

Authors/Year	Definition	Intervention
Shiffman, S. (2005)	≤ 15 cpd	Pharmacotherapy(NRT;Placebo)
Ahuwalia et al. (2006)	≤ 10 cpd	Pharmacotherapy(NRT;Placebo) + Counseling (Motivational interview; Health education)
Gariti et al. (2009)	6-15cpd	Pharmacotherapy (Bupropion, NRT, Placebo) + Counseling (intensive; brief)
Baha et al. (2010)	≤ 10 cpd	Data analysis of interventions
Cabriales et al. (2012)	1-10 cpd	Counseling (Brief +Motivational interview)
Cox et al. (2012)	≤ 10 cpd	Pharmacotherapy (Bupropion; Placebo) + Counseling (Health education)
Dios et al. (2012)	< 15 cpd	Pharmacotherapy (NRT; Varenicline; Placebo)
Hayes et al. (2013)	3-9 cpd	Counseling (Health education; Motivational interview)
Schane et al. (2013)	Non-daily smokers	Counseling (risks of smoking vs. benefits quitting + secondhand smoking)

Interventions and outcomes

The studies used counseling, pharmacological interventions or both. Some studies combined medication with counseling, while others applied one or the other. Among the medications, nicotine replacement treatment, (NRT), bupropion, and varenicline were prescribed. Non-drug interventions included brief intervention, intensive intervention, health education and motivational interviewing.

In general, the studies had positive cessation outcomes. Successful interventions included use of varenicline (Dios, Anderson, Stanton, Audet & Stein, 2012), pharmacotherapy and intensive counseling (Gariti, et al., 2009), counseling on the benefits of cessation (Schane & Prochaska, 2013), nicotine gum (Shiffman, 2005) and health education (Ahluwalia, 2006; Hayes & Borelli, 2013). The absolute abstinence rates in these studies, however, were low. Shiffman (2005) had the highest abstinence rate, reaching 45.7% abstinence in the group that used nicotine replacement.

Schane and Prochaska (2013) published a paper worth highlighting due the type of intervention used. After randomization, participants were separated into two groups. The first group received counseling about the risks of smoking and the second about the benefits of

cessation. Both groups received counseling about secondhand smoking, including the dangers of exposing other people to tobacco smoke. The results showed that the second group attained 36.8% abstinence while the first achieved only 9.5%, indicating that intervention based on the benefits of quitting may be promising for smoking cessation in light smokers.

In addition to the different forms of interventions, study results also varied. Two studies did not have significant findings. Cabriales, Cooper, Naylor, Salgado-Garcia and Gonzalez (2012), used brief intervention with motivational interviewing and did not find significant abstinence rates. Similarly Cox et al. (2012) combined bupropion with health education, and did not find significant rates of abstinence as a result.

Some studies differed in their outcomes even when they used the same method of intervention. Dios, et al (2012) tested the efficacy of varenicline versus nicotine replacement, and achieved abstinence only in the varenicline group (30%). Shiffman (2005), however, found positive results with nicotine replacement (45.7% in the experimental group vs. 31.1% in the control group). In contrast to Shiffman's trial, Ahuwalia et al. (2006) found no difference in abstinence rates with nicotine replacement therapy compared to placebo, although the response to health education was positive (16.7%). Is worth mentioning that five studies used the Fagerstrom Test for Nicotine Dependence to evaluate dependence (Ahluwalia et al., 2006; Cox et al., 2012; Dios et al., 2012; Gariti, et al., 2009; Hayes & Borrelli, 2013).

Baha and Le Faou (2010) conducted a secondary analysis of a database on tobacco cessation in France. The results showed that 16.4% of the sample were light smokers and that many had received pharmacologic or counseling as treatment. Light smokers were less willing to quit, less likely to receive medication and more likely to stop treatment early, compared with heavy smokers. On the other hand, nicotine replacement, varenicline and counseling were all effective in light smokers. The authors suggested that low levels of abstinence could be explained by inappropriate use of treatment for heavy smokers among light smokers.

Last, Gariti et al. (2009) found that the combination of pharmacology and counseling was useful for cessation treatment among light smokers. The authors argue that the use of medication by light smokers is safe. They found that the most effective treatment included bupropion and nicotine replacement, combined with intensive counseling.

Discussion

The aim of this study was to analyze empirical studies of tobacco cessation intervention in light and intermittent smokers, to understand the types of interventions that focus on these groups. We found, in general, there is still little interest in this topic, as only nine papers met the inclusion criteria. Light smoking research is not new in the international literature. In 1992, the U.S. Center of Disease Control and Prevention formally defined light smoking to include those that did not smoke every day (U.S. Department of Health and Human Services [USDHHS], 2005). However, research related to smoking cessation interventions in smokers with low level of cigarette consumption are still quite rare, even in the United States, which was responsible for eight of the studies found in this review.

There appears to be no consensus concerning the best form of treatment for this population. Researchers used various counseling techniques such as brief intervention, intensive counseling, motivational interviewing and health education, either combining techniques or using one type. They used diverse forms of pharmacotherapy, including nicotine replacement therapy (NRT), bupropion and/or varenicline. It is noteworthy that, in general, interventions that combined the use of some form of medicine and counseling had more positive cessation outcomes.

There also is no consensus regarding the definition of light smoking. Some authors defined lights smokers was those who smoke 10 or less cigarettes per day (Ahluwalia et al., 2006; Baha & Le Faou, 2010; Cabriales et al., 2012; Cox et al., 2012), while some argued that 9 cigarettes should be the limit (Hayes & Borrelli, 2013). In contrast, three studies claimed that those who

smoke 15 or less cigarettes per day can be considered low-level smokers (Shiffman, 2005; Dios et al., 2012; Gariti et al., 2009). These results corroborate other authors who have noted that there is still no single agreed-upon definition of the term (Husten, 2009).

Some studies found no difference in abstinence rates between heavy and light smokers, supporting the thesis that light smokers have the same difficulty quitting as heavy smokers. Shiffman's (2005) study was a secondary data analysis of a trial that compared abstinence rates in heavy and light smokers, which used same intervention with both groups (Shiffman, et al., 2002). Although the parent trial found positive outcomes from the nicotine replacement treatment, the authors did not find differences in the abstinence rates between the two groups. This result suggests that low-level cigarette smokers have the same difficulties quitting as heavy smokers (Tindle & Shiffman, 2011).

The Fagerstrom Test for Nicotine Dependence was used to measure dependence in light smokers among five papers. This test was developed in 1978. Since 1980 tobacco patterns have changed globally both in terms of reductions in smoking prevalence as well as reductions in the number of cigarettes smoked per day (Marie, et al., 2014). These changes may affect the validity of traditional dependence scales when applied to light smokers. Light smokers tend to score lower on this scale, registering as 'less dependent' than heavy smokers (Shiffman et al., 2012). Light smokers, however, appear to have similar abstinence rates to heavy smokers, and present dependence symptoms such as withdrawal, difficulty quitting and relapses. This suggests that scoring low on dependence scales does not necessarily indicate that light smokers lack nicotine dependence.

Numerous types of smoking cessation interventions were employed. So far, researchers are applying interventions designed for heavy smokers to light smokers. None of the reviewed studies developed a specific intervention for light smokers. Baha and Le Faou (2010) noted that the low cessation rates in light smokers in their study may have been due to the use of inappropriate interventions for this group. This may be applicable to most of the studies, as the physiological, psychological and social characteristics of light smokers were not incorporated into these interventions. The motivations of light smokers may differ from heavy smokers and ignoring this fact may reduce the efficacy of interventions (Okuyemi, et al., 2002).

On the other hand, Schane and Prochaska (2013) demonstrated that counseling based on the benefits of quitting has more positive effects with light smokers than counseling that stresses the risks of continued smoking. Others have argued that the use of positive messaging may be more effective than stressing the downsides of continued smoking. Szklo, Coutinho and Reichenheim (2012) compared the effect of those two strategies (gains from quitting versus losses from continued smoking) by alternating placement of posters in subways in the city of Rio de Janeiro with both strategies. They found the positive messaging to be the more effective strategy, which supports the notion that this approach could be an effective form of treatment for light smokers.

Most of the papers used daily smokers as an inclusion criterion, which in effect excluded intermittent smokers from research. Shane and Prochaska (2013) conducted the only trial that focused on non-daily smokers as a sample. Hence, too few interventions for intermittent smokers have been developed and tested, even though the literature indicates that intermittent smokers also exhibit dependence, and may need help to quit smoking (Shane & Prochaska, 2013).

In Brazil, the situation is even more complex. There is a lack of knowledge regarding the prevalence and characteristics of light and intermittent smokers in the country, a great deal of uncertainty of terms, and little focus on research and intervention. No intervention studies conducted in Brazil were found, in spite of some evidence that the prevalence of low-level smokers has been increasing in tandem with the worldwide decrease in the number of cigarettes smoked per day and increase in the prevalence of intermittent smokers (INCA, 2010).

This study has limitations. Due to the great variety in the definition of the term light smokers, articles that used terms other than those described in the methods of this review may not have been identified for review. Despite the intrinsic limitations from the methodological choices taken

in this review, we did conduct the review systematically. This will facilitate replication of the study in the future and permit comparisons with the results presented here.

Based on our findings, future research is sorely needed. These trials should include feasibility studies, strong experimental designs, and studies of interventions designed for the needs of light smokers. In addition, future studies should identify measures of dependence that are sensitive to light smoking, identify changes in main stream interventions that will accomodate this light/intermittant smoking, and explore reasons for smoking and difficulties in quitting. We recommend, therefore, that future research should develop new scales of dependence that focus on light and intermittent smokers, conduct prevalence studies to better understand this group, and conduct qualitative studies to understand the reasons that lead people to become light smokers and to better describe their difficulties quitting.

Conclusions

Smoking cessation interventions in light smokers are at an early stage. There is no published research about interventions that were specifically designed for this group. All of the studies found were interventions initially proven to be effective among heavier smokers. The only apparent change was the sample of the studies.

The interventions had significant variations and no conclusive results. Successful interventions mostly employed a combination of pharmacology and counseling. Some studies, however, did not find significant abstinence rates even when combining techniques of cessation, while others had positive outcomes using solo treatment.

Research in light and intermittent smokers remains the road less traveled in tobacco control (Husten, 2009). The field is marked by lack of consensus in definitions, varying cutpoints for light smoking, and the use of measures with poor sensitivity. There is a strong need, at the international and national level, for a major focus on research and practice related to low-level cigarette smoking.

As previously mentioned, smoking patterns are changing, increasing the prevalence of light smokers worldwide, including Brazil. Existing studies in the scientific literature, despite some positive results, provide insufficient guidance for the treatment of light and intermittent smoking. There is an urgent need for further investment in research in the area, in order to understand this pattern of smoking, promote smoking cessation interventions, and reduce tobacco-related morbidity and mortality worldwide.

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