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ASSOCIATION OF CIGARETTE SMOKING AND RISK OF URINARY BLADDER CANCER : A SYSTEMATIC REVIEW

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ABSTRACT

Background: *It has been proposed that smoking cigarettes increases the likelihood of urinary bladder cancer (UBCa). But not everyone who smokes heavily gets these illnesses, and first-degree relatives' higher cancer risk points to a significant hereditary component.*

Aims : *This systematic review is to review the association between cigarette smoking and its risk of urinary bladder cancer in men and women.*

Methods: *This study demonstrated compliance with all requirements by means of a comparison with the standards established by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020. Thus, the specialists were able to guarantee that the research was as current as feasible. Publications released between 2014 and 2024 were considered for this search strategy. This was accomplished by utilizing a number of distinct online reference sites, including Pubmed, ScienceDirect, and SagePub. It was determined that reviews, previously published works, and partially completed works would not be included.*

Result: *In the PubMed database, the results of our search brought up 729 articles, whereas the results of our search on SAGEPUB brought up 1495 articles, our search on SCIENCE DIRECT brought up 11284 articles. The results of the search conducted for the last year of 2014 yielded a total 177 articles for PubMed, 442 articles for SAGEPUB and 3775 articles for SCIENCE DIRECT. In the end, we compiled a total of 8 papers, 5 of which came from PubMed, 1 of which came from SAGEPUB and 2 of which came from SCIENCE DIRECT. We included eight research that met the criteria.*

Conclusion: *In summary, tobacco smoking was a strong risk factor for bladder cancer for both men and women.*

Keyword: *Cigarette, urinary bladder cancer, risk*

INTRODUCTION

Worldwide, about 350,000 people are diagnosed with incident bladder cancer annually, with over 70,000 of those cases occurring in the United States. Over the course of the last 30 years (1976–2006), incidence rates for White individuals aged 50 and over have remained consistent, rising from 123.8/100,000 person-years to 142.2/100,000 person-years for men and from 32.5/100,000 person-years to 33.2/100,000 person-years for women, according to data from the Surveillance, Epidemiology and End Results (SEER) Program. Similar trends have been observed in other racial and ethnic groups. Tobacco smoking, which was first assessed in the 1950s, is the most reliable known risk factor for bladder cancer in both men and women. The incidence of bladder cancer has not changed in the last thirty years, although over that same period, cigarette smoking has become significantly less common in the US.[1]

Previous studies have generally found that risk estimates for current smokers are in the range of three. However, over the past 50 years, the makeup of cigarettes has changed, which has resulted in a decrease in the amounts of nicotine and tar in cigarette smoke as well as an apparent increase in the amounts of certain carcinogens, such as tobacco-specific nitrosamines and the known bladder carcinogen β-napthylamine. Alongside these modifications to the components of cigarette smoke, epidemiological research has shown increased relative risks of lung cancer from cigarette smoking.[2]

The strength of the link between cigarette smoking and bladder cancer may have strengthened as well, according to a recent report from the New England Bladder research, a sizable population-based case-control research. The authors of this article examined three comparable population-based case-control studies conducted in New Hampshire in 1994–1998–2001–2004, and compared the odds ratio for current smokers against never smokers. Increased correlations between smoking and bladder cancer may counteract the decline in smoking rates in the US population and explain the stability of bladder cancer incidence rates during the previous three decades. Replication of these results is necessary, especially in prospective cohort studies.[3]

The estimated population attributable risks (PAR) associated with tobacco use are 20–30% for women and 50–65% for males. However, these approximations were derived from research carried out in communities and during times when smoking prevalence was higher in males than in women.[2]

METHODS

Protocol

The author of this study ensured that it complied with the standards by adhering to Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines. This is done to guarantee the accuracy of the results that are derived from the investigation. Thus, the specialists were able to guarantee that the research was as current as feasible. Publications released between 2014 and 2024 were considered for this search strategy. This was accomplished by utilizing a number of distinct online reference sites, including Pubmed, ScienceDirect, and SagePub. It was determined that reviews, previously published works, and partially completed works would not be included.

Criteria for Eligibility

In order to completse this literature evaluation, we looked at published research that discusses the association between cigarette smoking and its risk of urinary bladder cancer in men and women. This is done to enhance the patient's therapy management and to offer an explanation. This paper's primary goal is to demonstrate the applicability of the issues that have been noted overall.

To be eligible to participate in the study, researchers had to meet the following requirements: 1) English must be used to write the paper. The manuscript must fulfill both of these conditions in order to be considered for publication. 2) A few of the examined studies were released after 2013 but prior to the time frame considered relevant by this systematic review. Editorials, submissions without a DOI, already published review articles, and entries that are nearly exact replicas of journal papers that have already been published are a few examples of research that are prohibited.

Search Strategy

We used "cigarette" and "bladder cancer" out using the PubMed and SAGEPUB databases by inputting the words: ((("cigarett"[All Fields] OR "cigarette s"[All Fields] OR "cigaretts"[All Fields] OR "tobacco products"[MeSH Terms] OR ("tobacco"[All Fields] AND "products"[All Fields]) OR "tobacco products"[All Fields] OR "cigarette"[All Fields] OR "cigarettes"[All Fields]) AND ("urinary bladder neoplasms"[MeSH Terms] OR ("urinary"[All Fields] AND "bladder"[All Fields] AND "neoplasms"[All Fields]) OR "urinary bladder neoplasms"[All Fields] OR ("urinary"[All Fields] AND "bladder"[All Fields] AND "cancer"[All Fields]) OR "urinary bladder cancer"[All Fields])) AND (2014:2024[pdat]) used in searching the literature.

Data retrieval

After reading the abstract and the title of each study, the writers performed an examination to determine whether or not the study satisfied the inclusion criteria. The writers then decided which previous research they wanted to utilise as sources

for their article and selected those studies. After looking at a number of different research, which all seemed to point to the same trend, this conclusion was drawn. All submissions need to be written in English and can't have been seen anywhere else.

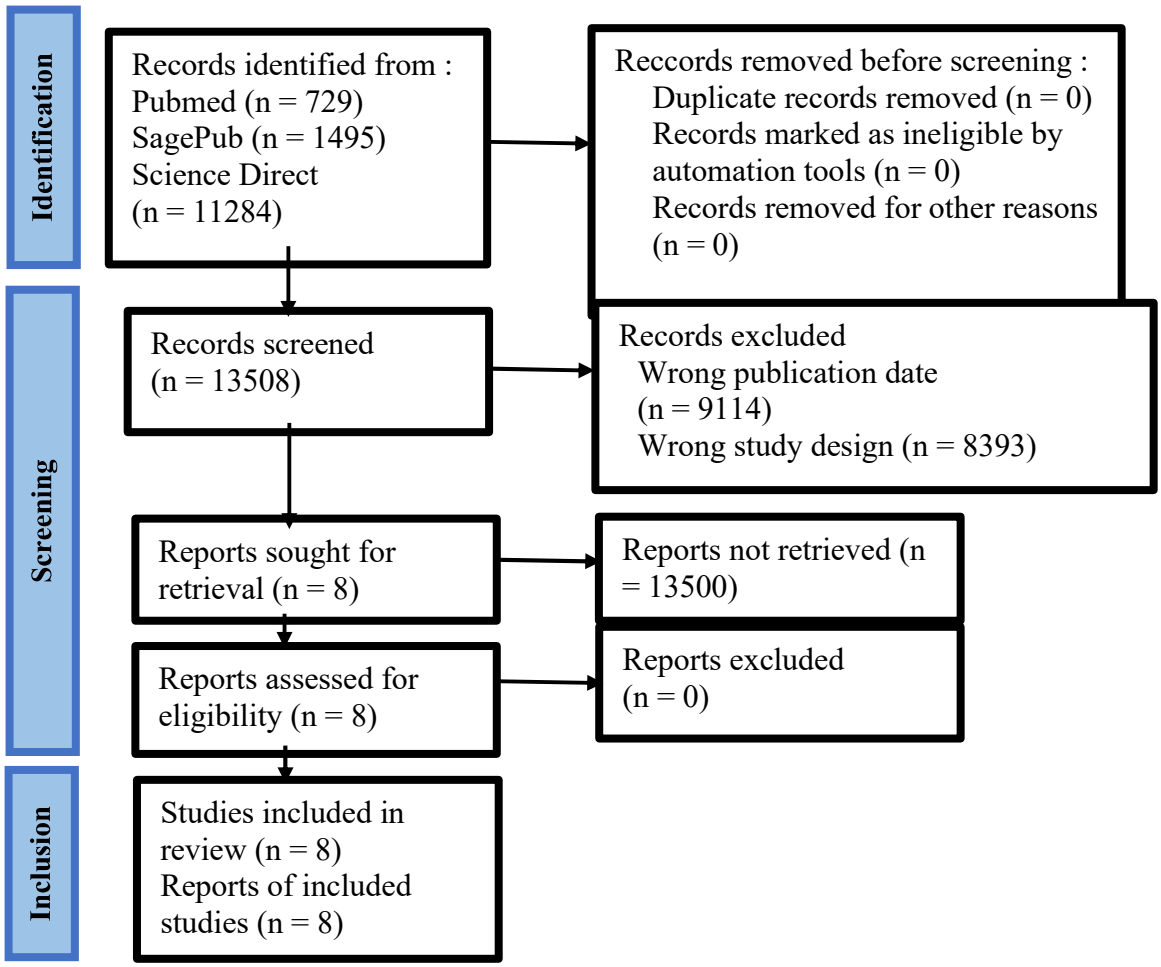

Figure 1. Prisma Flow Diagram

Only those papers that were able to satisfy all of the inclusion criteria were taken into consideration for the systematic review. This reduces the number of results to only those that are pertinent to the search. We do not take into consideration the conclusions of any study that does not satisfy our requirements. After this, the findings of the research will be analysed in great detail. The following pieces of information were uncovered as a result of the inquiry that was carried out for the purpose of this study: names, authors, publication dates, location, study activities, and parameters.

Quality Assessment and Data Synthesis

Each author did their own study on the research that was included in the publication's title and abstract before making a decision about which publications to explore further. The next step will be to evaluate all of the articles that are suitable for inclusion in the review because they match the criteria set forth for that purpose in the review. After that, we'll determine which articles to include in the review depending on the findings that we've uncovered. This criteria is utilised in the process of selecting papers for further assessment. in order to simplify the process as much as feasible when selecting papers to evaluate. Which earlier investigations were carried out, and what elements of those studies made it appropriate to include them in the review, are being discussed here.

RESULT

In the PubMed database, the results of our search brought up 729 articles, whereas the results of our search on SAGEPUB brought up 1495 articles, our search on SCIENCE DIRECT brought up 11284 articles. The results of the search conducted for the last year of 2014 yielded a total 177 articles for PubMed, 442 articles for SAGEPUB and 3775 articles for SCIENCE DIRECT. In the end, we compiled a total of 8 papers, 5 of which came from PubMed, 1 of which came from SAGEPUB and 2 of which came from SCIENCE DIRECT. We included eight research that met the criteria.

Jimenez, et al[4] (2015) showed that urinary mutagenicity is decreased by increasing water consumption. The development of urine adducts does not support it. It would be essential to conduct more study.

Boeri, et al[5] (2019) showed that in patients with muscle invasive bladder cancer (MIBC) treated with radical cystectomy (RC), cigarette smoking was strongly linked to an unfavorable pathological response to cisplatin-based neoadjuvant chemotherapy (NAC). Comparing current smokers to past and never smokers, there was a substantial increase in the probability of illness recurrence.

Kwan, et al[6] (2022) showed that a greater chance of NMIBC recurrence was linked to longer smoking duration and more pack-years. For NMIBC survivors, smoking cigarettes continues to be a risk factor both before and after diagnosis.

Gild, et al[7] (2020) showed that a negative correlation exists between smoking status and the pathological response to NAC. Smokers should be made aware of these negative consequences, given advice on how to stop, and perhaps given consideration for immunotherapeutics, as they may work better for smokers.

Table 1. The litelature include in this study

Author	Origin	Method	Sample	Result
Jimenez et al, 2015[4]	France	Randomized study	65 patients	A total of sixty-five participants were randomized. With 20 cigarettes a day on average, the mean age was 30 years old. There was a little drop in the production of adducts between the last visit and baseline, but there was no statistically significant difference between the groups. Urinary mutagenicity was considerably reduced. According to the study, drinking more water reduces the mutagenicity of urine. The development of urine adducts does not support it. It would be essential to conduct more study.
Boeri et al, 2019[5]	USA	Randomzied study	201 patients	Among current smokers, no response to NAC was observed more frequently (73.2%; P = 0.007). Once age, gender, Charlson Comorbidity Index, and clinical stage were taken into account, there was a significant correlation found between the status of being a current smoker (OR 4.52; P < 0.001) and a former smoker (odds ratio [OR] 2.28; P = 0.024) and no response to NAC. In a similar vein, extravesical pathological tumor stage (HR 3.31; P < 0.001) and current smoking status (hazard ratio [HR] 2.14; P = 0.03) were found to be independently linked to a higher risk of recurrence following RC.
Kwan et al, 2022[6]	USA	Prospective cohort study	1472 patients	In a dose-dependent manner, longer cigarette smoking duration and more pack-years were linked to a greater risk of

				recurrence; patients who smoked for 40 years or more had the highest risk (HR, 2.36; 95% CI, 1.43-3.91), as did those with 40 pack-years or more (HR, 1.97; 95% CI, 1.32-2.95). There was no correlation found between the likelihood of recurrence and the number of years since quitting smoking, whether one had ever smoked or not. There were no correlations discovered with pipes, cigars, e-cigarettes, or marijuana. Of the 102 patients who were given the option to participate in a smoking cessation intervention, 57 (53.8%) did so after receiving a diagnosis; female patients were more likely than male patients to do so (23 of 30 female patients [76.7%] versus 34 of 76 male patients [44.7%]; P =.003).
Gild et al, 2020[7]	Europe	Observational prospective study	167 patients	Smoking was substantially linked to worse ECOG performance status (p = 0.049), lower pathological response to NAC (p = 0.045), and advanced age (p = 0.013). The results of multivariable logistic regression analyses showed that current smoking status was significantly associated with a greater likelihood of no pathological response (OR 2.49, 95% CI 1.02-6.06, p = 0.045), while former and current smoking status was significantly associated with lower odds of complete pathological response (odds ratio (OR) 0.37, 95% confidence interval (CI) 0.16-0.87, p = 0.023, and OR 0.34, 95% CI 0.13-0.85, p = 0.021). It has been established that response to NAC is a strong indicator of survival.
Lewin et al, 2021[8]	Sweden	Prospective study	92 patients	The only gene that differed between the CAD and UBCa patient groups and the control group was CTLA4 rs3087243. The impact of smoking was linked to frequencies of 8, 3, and 4 SNPs in CAD, UBCa, and LCa patients, respectively, stratified by smoking status. Among smoking patients, none of these 92 SNPs shown a statistically significant

				difference to more than one form of illness. Seven, three, and six SNPs were linked to CAD, UBCa, and LCa in non-smoking individuals, respectively. Among the 92 SNPs, CTLA4 rs3087243 was linked to UBCa and non-smoking CAD. Both non-smoking UBCa and LCa were linked to the XRCC1 rs25487.
Xiong et al, 2022[9]	China	Randomization study	1115 patients	According to the UK Biobank collaboration and the FinnGen study, there was a positive correlation between an elevated risk of bladder cancer and genetic predisposition to cigarettes per day, lifetime smoking index, and smoking beginning. For a one standard deviation increase in the number of cigarettes per day, lifetime smoking index, and smoking initiation, the bladder cancer summary odds ratio (OR) was 1.79 (95% confidence interval [CI], 1.31-2.45; P =.0002), 2.38 (95% CI, 1.45-3.88; P =.0005), and 1.91 (95% CI, 1.46-2.50; P = 1.59 × 10-06), respectively. There was no correlation between the genetically determined number of beverages consumed weekly and bladder cancer (OR = 0.69; 95% CI, 0.44-1.10; P =.1237). When body mass index and education were adjusted for in multivariable MR analysis, the estimates were similar.
Catto et al, 2023[10]	United Kingdom	Cross sectional study	2092 patients	E-cigarette use was rare (9%) and less prevalent than the total population at the same age. Exposure to passive smoking was common (48%). According to the GODIN criterion, the majority of participants (68%) were "insufficiently active" and engaged in less physical activity than the age-matched general population. Lifestyle characteristics differed according to LTCs, sex, age, and socioeconomic status. Younger individuals had a higher likelihood of using e-cigarettes ($p < 0.001$) and being exposed to passive smoke ($p = 0.008$), although they were less likely to smoke ($p < 0.001$). Less wealthy

				individuals had higher odds of smoking ($p < 0.001$), using e-cigarettes ($p < 0.001$), and being exposed to passive smoking ($p = 0.02$). While they were more likely to have been exposed to passive smoking, females were less likely to smoke ($p < 0.001$).
Knapp et al, 2024[3]	USA	Prospective study	120 patients	Liquid chromatography-mass spectrometry was used to quantify the content of urine cotinine in order to further evaluate possible exposure to cigarette smoke. Odds ratio [OR], 6.34; 95% confidence intervals [CI], 1.16–34.69; P = 0.033; living within a mile of a marsh or wetland (OR, 21.23; 95% CI, 3.64–123.69; P = 0.001); and history of prior bladder infections (OR, 3.87; 95% CI, 1.0–14.98; P = 0.050) were all significantly associated with biopsy-confirmed UC, which was discovered in 32 out of 120 dogs. Six of the 40 dogs (15.0%) without measurable cotinine concentrations in their urine and 18 of the 51 dogs (35.3%) with quantifiable cotinine concentrations had UC diagnoses (P = 0.0165).

Lewin, et al[8] (2021) showed that SNPs may have a significant role in the risk of CAD, UBCa, and LCa. The SNP distribution was not random; rather, it was unique to each patient group. The impact of smoking cigarettes on the illness was linked to certain SNP sequences. Thus, a key target population for smoking cessation efforts includes smokers having SNPs linked to risk of these dangerous illnesses.

Xiong, et al[9] (2022) showed that based on available data, there may be a causal relationship between bladder cancer and smoking, but not alcohol intake.

Catto, et al[10] (2023) showed that people with BC frequently smoke, have high BMIs, and engage in inadequate physical activity. The usage of e-cigarettes was not as prevalent as it is in the general population. In an attempt to enhance the quality of life for this group of people, more should be done to encourage quitting smoking, maybe with the use of e-cigarettes, as well as programs that promote physical activity and lower body mass index.

Knapp, et al[3] (2024) showed that for this particular dog group, exposure to secondhand tobacco smoke was the primary modifiable risk factor for UC. The advantages of shielding Scottish terriers and maybe other canines from smoke exposure are highlighted by the study's findings. The results validate the use of high-risk breed dogs in the investigation of gene-carcinogen interactions that may be relevant to both canine and human UC, as well as the development of cancer preventive methods centered around these interactions.

DISCUSSION

It has been proposed that smoking cigarettes increases the likelihood of developing lung cancer (LCa), urinary bladder cancer (UBCa), or coronary artery disease (CAD). But not everyone who smokes heavily gets these illnesses, and first-degree relatives' higher cancer risk points to a significant hereditary component.A significant target category for smoking cessation programs is smoking persons with SNPs connected to risk of these severe illnesses, since variations in the distribution of 14 of the 92 SNPs analyzed were found between the control and patient groups.[8]

Boeri, et al in their study of 201 patients that treated with NAC and RC, showed that cigarette smoking associated in higher risk of disease such as muscle invasive bladder cancer recurrence as compared to former and never smoker.[5] Kwan, et al also showed that longer duration and more years of smoking behavior will high the risk of bladder cancer recurrence.[6] This also showed in study by Gild, et al in 167 patients with follow up to 15 months, that smoking behavior associated with pathological response to NAC and will be less effective in immunotherapeutics of bladder cancer.[7]

Smoking will cause the potential risk of bladder cancer in human. This also proved by study of Xiong, et al in 1115 patients with bladder cancer.[9] People with BC frequently smoke, have high BMIs, and engage in inadequate physical activity. The usage of e-cigarettes was not as prevalent as it is in the general population. In an attempt to enhance the quality of life for this group of people, more should be done to encourage quitting smoking, maybe with the use of e-cigarettes, as well as programs that promote physical activity and lower body mass index.[10]

CONCLUSION

In summary,

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