SYSTEMATIC REVIEW: PREVALENCE OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN SMOKING MALE PATIENTS

Vanessa Rajendren[1], Dewa I Gde Mahiswara Sudiatmika[2],
Pande Putu Yuli Anandasari[2], Ni Nyoman Margiani[2]

[1]Programme of Medicine and Health, Faculty of Medicine, Udayana University, Denpasar, Bali

[2]Department of Radiology RSUP Sanglah/ Faculty of Medicine, Udayana University, Denpasar, Bali

Email: vanessarajendren1597@gmail.com

Abstract: **COPD, or chronic obstructive pulmonary disease, is a group of respiratory lung disorders that cause breathing problems by blocking the flow of air from the lungs. This disease is often accompanied by chronic bronchitis (inflammation and narrowing of the airways or bronchial tubes) and emphysema (damage to the lining of the air sacs of the lungs). Systematic reviews with inclusion and exclusion criteria through search engines obtained 110 journals that were reviewed. A total of 8 journals were suitable as references for writing this review. The data obtained were qualitative and quantitative data which were then arranged systematically according to each topic discussed so that conclusions were obtained who presented the contents of the review. We observed that the number of patients with chronic obstructive pulmonary disease increased gradually. COPD is most common in older men. However, the prevalence of COPD among men who smoke is statistically high. There are many risk factors that contribute to COPD such as smoking, exposure to occupational dust-air pollution and genetics. In most cases,smoking is the major cause of COPD among men.**

Keywords: **chronic obstructive pulmonary disease, prevalence, gender.**

1. INTRODUCTION

Chronic obstructive pulmonary disease or better known as COPD is a group of diseases that cause airflow blockage and breathing-related difficulties.This includes emphysema and chronic bronchitis.There are 16 million Americans who suffer from COPD and find it impossible to breathe. Millions more have COPD either haven't been diagnosed or aren't getting medication. COPD should be treated, even if there is no remedy.Generally,there are two types of COPD which are emphysema and chronic bronchitis.Emphysema affects the air sacs in your lungs,as well as the walls between them.It becomes damaged and less elastic.Whereas,in chronic bronchitis the lining of the airways are always irritated and inflamed causing the lining to swell and produce mucus.[1]

There are many causes of COPD such as secondhand smoke,air pollution,and chemical fumes or dusts from the environment or workplace.COPD normally are long term effects of exposure to irritants that damage the lungs and airways. Pipe, cigar and other types of tobacco smoke can also cause COPD if inhaled.Age can also be a factor because most of them who are having COPD are at the age of above 40 years. In some rare cases,a genetic condition called alpha 1-antitrypsin deficiency can play a role in causing COPD.In many countries out there,cigarette smoke is the number one cause of COPD.[2]

First and foremost,Symptoms of COPD include not having any symptoms or just have minor ones.As the disease get severe,the symptoms worsens. Classical symptoms are frequent coughing or cough that produces a lot of mucus,wheezing,whistling or a squeeking sound when breathing.Shortness isof breath during activity and tightness in the chest are also common symptoms.Some people with COPD get frequent respiratory infections such as colds and flu.In severe cases,COPD can cause weight loss,weakness in the lower muscles and swelling at the ankles,feet and legs.[3]

Lastly, tobacco smoking is a significant risk factor for COPD, only about 20 percent of smokers develop the condition. More data is rising to show that other risk factors such as air quality, respiratory diseases, poor nutritional status, chronic asthma, reduced lung growth, poor socio-economic status and genetic factors are also significant for disease development. Around 15–20 percent of COPD cases are caused by occupational reactions to toxins at work and about half of COPD patients in developing countries were exposed to biomass smoke at some point during their lives.[4,5]

2. MATERIALS AND METHODS

Protocol and registration

A comprehensive summary in the form of a systematic review regarding the prevalence of chronic obstructive pulmonary disease in male smoking patients. The protocols used in this study are The Center for Review and Dissemination and The Joanna Briggs Institute Guideline as a guide in evaluating the quality of the collected studies. Systematic review assessment uses the PRISMA checklist to determine the completion of studies that have been found and adjusted to the objectives set.[6]

Eligibility Criteria

The strategy used in finding articles is the PICOS framework which consists of:

1. Population is the population or problem that will be analyzed based on this systematic review topic

2. Intervention is an action in the form of therapy given to cases in accordance with this systematic review topic

3. Comparison is another action or intervention that is used as a comparison. If none of these are applicable, the control group in the selected study is used

4. Outcome is the result or outcome obtained in previous studies in accordance with the topic of this systematic review

5. Study design is a research design used by selected articles for further review. Further description of the PICOS framework used in this systematic review can be seen in table 1

Table 1: PICOS framework criteria for systematic review the prevalence of chronic obstructive pulmonary disease among male and female

PICOS framework	Kriteria Inklusi	Kriteria Eksklusi
Population	A study of chronic obstructive pulmonary disease, >> 40 years old	A study with a population that is having chronic obstructive pulmonary disease, << 40 years old
Intervention	Studies evaluating the risk factors causing COPD	There were no exclusion criteria
Comparison	The comparison intervention groups used were male smokers and non smokers.	There were no exclusion criteria
Outcome	Studies that describe the risk factors of COPD	Studies that do not address the risk factors of COPD in adults less than 40 years old
Study design	Randomized control trial, original research	Case control, animal studies, literature review

In addition, the eligibility criteria are also used through the publication year of the articles used, namely 2010-2021 as inclusion criteria with national and international journals

Information Sources

Literature searches conducted during January 2021 to March 2021 against literature obtained from previous researchers or secondary data in the form of national and international journals using the database such as PubMed, Science Direct, and Google Scholar.

Literature Tracing Strategy

Literature search is carried out by keywords and using filters in the form of MeSH (Medical Subject Headings) and text words so that it can make it easier to find the literature to be used. The filters used were: chronic obstructive pulmonary disease, OR COPD and smoking.

Study Selection

Based on the results of a literature search through the database that was previously mentioned using keywords and filters,110 articles were obtained. Futhermore, a selection was carried out in the form of screening based on the title and abstract so that there were 25 articles. A total of 25 articles were then analyzed thoroughly using inclusion and exclusion criteria so that there were 9 articles that could be used in this systematic review.

Data Collection Process

The checklist sheet obtained from PRISMA was used by researchers to evaluate the literature used and extract data from articles which were then typed according to the thesis guide. Furthermore, the data collection process carried out is as follows:

1. Use of guides in the form of The Center for Review and Dissemination and the Joanna Briggs Institute and the PRISMA Checklist

2. Use of keywords and filters in the form of MeSH to find literature in the database

3. Determination of the database used in this study is PubMed and Google Scholar

4. The determination of the eligibility criteria is carried out using the PICOS framework and criteria in the form of inclusion and exclusion

5. The study selection process was carried out by reading the entire article according to the PRISMA flow

6. Taking into account the possibility of bias results with the JBI Critical appraisal, then the appropriate article will be analyzed and synthesized in this systematic review

Types of Data and Variables

Based on the topics used in this systematic review, it should have data on several variables as follows:

1. Research characteristics data in the form of the type of study used, location, research year, number of COPD, history of smoking, active / passive smoking and number of packs

2. The cause of COPD in male smokers and non smokers

3. Limitations faced by researches in conducing analysis or research process

Risk Assessment of Bias in Individual Studies

The risk assessment can be carried out using the JBI Critical Appraisal in analyzing the methodology used by the study that will be used in the preparation of this systematic review. A critical appraisal (CA) was conducted to assess a study as having a score of at least 50% meeting the CA criteria. The risk of bias in this systematic review uses an evaluation of research methods in each study consisting of:

1. Theory: the explanation in the form of a theory presented is inappropriate, out of date, and lacks credibility

2. Design and research instruments: designs that do not fit the research objectives and instruments that are invalid or reliable

3. Variables: unsuitable research that do not address the characteristic to be observed

4. Analysis: use of the type of analysis that is not in accordance with the standards of analysis

Summary Measures

The number of smoking male patients causing COPD is the main variable evaluated in this systematic review. The results of the literature search used were based on JBI CA and PRISMA which were then presented in the form of number of copd,history of smoking, active / passive smoking and number of packs

Synthesis of Results

The result synthesis used in this systematic review is a descriptive method, namely an explanation in the form of a narrative description in describing the results obtained. The narrative explanation used aims to gather evidence about the prevalence of chronic obstructive pulmonary disease in smoking male patients develop a coherent and systematic textual

narrative. The data were evaluated by review questions namely background, theoretical framework, research objectives, research content, research design, sample size, sampling method, sample description, validity and reliability, instruments used, statistical analysis, and analysis of results.

Additional Analysis

The analysis used in this systematic review is descriptive analysis by narrating the findings of scientific articles. This study did not use any other additional analysis techniques, the researcher only summarized the results in the literature then analyzed descriptively with a description in the form of a narrative explanation.

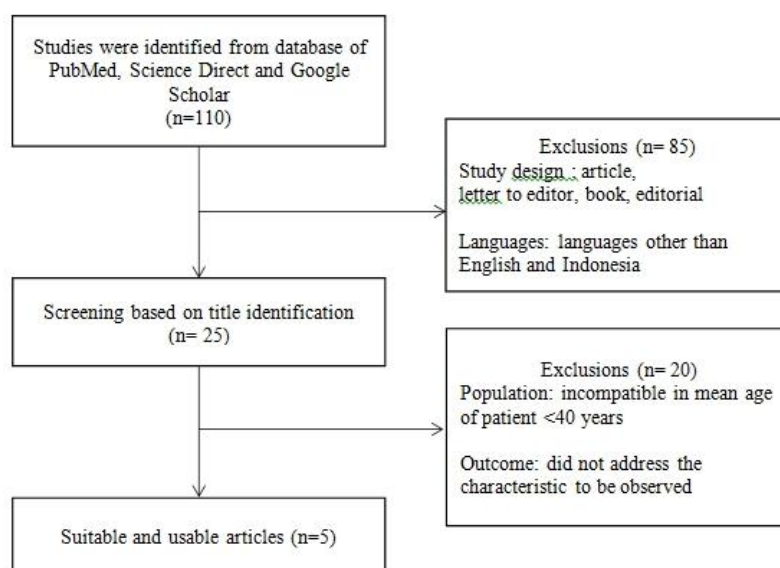## 3. RESULTS

Literature Selection

Figure 1: Literature Search Flow Diagram Prevalence of Chronic Obstructive Pulmonary Disease (COPD) in Smoking Patients

Study Characteristic

The characteristics of the articles used are 5 study articles (table 2) consist of cohort study (4), cross sectional study (1) taken from published period 2010 to 2021. The population in the study of the articles used in this systematic review is a population originating from 5 different countries (India, Canada, Netherlands, Japan, and Korea) also the patient mean ages more than 40 years.

Table 2: Characteristics of the Study Used

Study	Type of Study	Location	Year Research	Total Patient	Age (years)	Ever smokers (Pack-years)
Jain *et al.*, 2011	Cohort study	India	2008-2009	702	60.61 ± 10.36	36.7 ± 15.5
Nadeau *et al.*, 2017	Cross-sectional study	Canada	January 2014 – July 2015	199	63 ± 10	51.5 ± 20.2
Terzikhan *et al.*, 2016	Cohort study	Netherlands	2002-2008	14619	65.8 ± 10.4	30.3 ± 21.3
Kurashima *et al.*, 2017	Cohort study	Japan	2000-2016	857	69.4 ± 7.8	66.9 ± 34.3
Kim *et al.*, 2019	Cohort study	Korea	2005-2015	627	61.9 ± 11.91	NA

NA: Not available

Table 3: Prevalence of Chronic Obstructive Pulmonary Disease (COPD) and Smoking Patients as Risk Factor From Articles

Characteristics	Total Studies	Number of Patients with Characteristics	Number of Patients Checked
Gender			
Males	5	2653 (15.7%)	17004
Females		1257 (7.3%)	17004
Smoking status			
Never		483 (2.8%)	17004
Former	5	1171 (6.8%)	17004
Current		1240 (7.3%)	17004

Based on the tables above, the gender of the patient as stated in 5 articles shows that the patient is predominantly male.Based on the smoking status of the research sample reviewed, it showed that the majority of COPD cases were suffered by smokers with the highest percentage of 7.3% who were still active smokers at the time of the examination compared to patients with no smoking and former smoking history. Active smoking status until examination indirectly indicates long-term use. This is shown by several studies that used the criteria for at least 10 years of active smoking with the frequency of annual packs shown in table 2.

Table 4: Prevalence of COPD in smoking patients based on races

Characteristics	Total Studies	Number of Patients with Characteristics	Number of Patients Checked
Race			
Central European		1638	14619
Asian	1	14	14619
African		2	14619
Admixed		3	14619

Based on the table 3.3 above,the prevalence of COPD in smoking patients based on races were reviewed out of five articles, only 1 article mentioned race factor which is Central European race as the highest number of COPD sufferers because the total number of patients from Canada and Netherlands are 14,818 patients with the percentage of 11.2%.

Risk of Study Bias

The study quality of each article that was determined as the source of systematic review was determined based on the quality analysis of The JBI Critical Appraisal Tools Cross-sectional Studies and The JBI Critical Appraisal Tools Cohort Studies, so that 5 articles were obtained according to the systematic review. The literature results that have been analyzed and determined in a systematic review are as follows.

Reference	The JBI Critical Appraisal Tools											Result
	1	2	3	4	5	6	7	8	9	10	11	
Jain *et al.*,2011	v		v	v	v	v	v	v			v	8/11 (72%)
Nadeau *etal.*, 2017	v	v	v	v	v	v	v	v				8/8 (100%)
Terzikhan *et al.*, 2016	v			v	v	v	v	v	v	v	v	9/11 (81%)
Kurashima *et al.*, 2017	v		v	v	v	v	v	v			v	9/11 (81%)
Kim *et al.*, 2019	v	v	v			v	v	v v			v	7/11 (63%)

Of the 5 studies that met the criteria for this systematic review (Table 3.4), the results obtained are 1 articles of cross-sectional study and 4 articles of cohort (1 prospective and 3 retrospective). After performing critical appraisal using The JBI critical appraisal tools, cross-sectional study is given a quality score of eight while cohort studies are given a total quality score of seven to nine per eleven on the checklist. Based on the overall study summarized, all research on average contains variable characteristics that are ready to be observed. The assessment bias in the study shows that the results of articles that are assigned to systematic reviews are at risk of selection bias because the determination of sample size in some articles is by non-probability techniques, resulting in a lack of random selection procedures in the study samples

4. DISCUSSION

Summary of evidence

This systematic review is a summary of the outcomes for prevalence of chronic obstructive pulmonary disease in smoking male patients. This review discusses about the correlation of smoking and COPD.In addition, the results of data from several studies indicate that elderly man are most commonly affected by COPD compared to female due to man having the highest prevalence of smoking. However, as the years progressed the prevalence of smoking among women have increased significantly.[2]

Chronic obstructive pulmonary disease or better known as COPD is a respiratory lung disease that block airflow from the lungs and cause breathing difficulties. Chronic bronchitis is an inflammation and the narrowing of the airways and the bronchial tubes. On the other hand, emphysema damages the linings of the air sacs of the lungs and often a part of this disease. Although cigarette smoke is the most prevalent cause of COPD,[3] it is estimated that 20 percent of people who develop COPD have never smoked.[7] Other putative risk factors include an excessive susceptibility and exaggerated reaction to inhaled pollutants and other exposures such as second-hand smoking, use of biomass fuels, exposure to ambient dust or organic material in the workplace, or exposure to air pollution.[2]

COPD is diagnosed through spirometry, which can detect COPD even in people who do not yet have symptoms. Currently, there is no cure for COPD, although available therapy can improve symptoms, quality of life, and prevent acute worsening of the disease.[8] COPD was once considered to be predominantly a disease among older male smokers, but it is now becoming more common in women. According to recent data, the prevalence and mortality of COPD have risen faster in women than in men.[9,10]

COPD is also classified into 4 stages called as GOLD criteria. This includes the symptoms in various stages from GOLD 1, GOLD 2, GOLD 3 and GOLD 4. GOLD 1 symptoms are when usually begins with a persistent cough. It could be dry, or it could be clear, white, yellow, or green mucus. Shortness of breath can be experienced from time to time, particularly if you force yourself. GOLD 2 symptoms are when constant coughing and mucus, which is usually worse in the morning with shortness of breath that makes even basic household tasks difficult. Exhaustion due to disturbed sleeping hours. During workout or flare-up, wheezing may occur. All these sypmtoms may also gradually on the mental health. GOLD 3 symptoms are severe because all these symptoms would be more often than usual. Lips and finger nails may begin to turn gray or blue due to inadequate oxygen supply. Lastly, GOLD 4 symptoms are when it's staged as very severe because FEV1 / FVC will be less than 70% and FEV1 less than 30%. At this stage, short-term outlook depends more on how severe the flare is than how severe your COPD is. However, the seriousness of the COPD, as well as associated diseases such as lung cancer, coronary disease, sleep apnea, metabolic syndrome, and diabetes, are what matters in the long term.[11]

Unfortunately, population-based estimates of COPD prevalence by country are difficult to come by because the disease is progressive, calculation methods and definitions differ between studies, and spirometry is often unavailable in developing countries. In such cases, reported disease incidence and prevalence can become overly reliant on factors other than disease occurrence.[12] For instance, due to misclassification of other respiratory diseases, prevalence based on self-reported symptoms (chronic cough, sputum, and so on) can overestimate true COPD prevalence.[13] Furthermore, studies differ significantly in terms of case description, study nature, sample size, and data interpretation, making comparisons and assessment of findings between studies difficult.

Limitation

Based on the research, the dominant cross-sectional study has limitations on the limited research sample. This was followed by a prospective cohort study which had limited follow-up and follow-up to assess definite characteristics. This systematic review found the risk of bias as a limitation of various studies. The biases found from this study include selection bias and information bias. In addition, the risk of bias can also be found from the literature search due to the limited number of studies regarding the prevalence of COPD in smoking male patients.

5. CONCLUSION

Based on the results and discussion, it can be concluded that risk factors contributing to chronic obstructive pulmonary disease are smoking, secondhand smoke, use of biomass fuel, exposure to occupational dust and air pollution. It has also been concluded that men still have a higher prevalence globally compared to women because the number of men smoking is still high. Many of them start smoking at a very young age and face the consequences of COPD when they are old. Smoking status of the patients were also inquired during the survey. The total number of patients checked were 17,004 out of that, patients with no history of smoking was 483, whereas the ex, smokers was 1171 patients and current smokers was 1240 patients. This concludes that non smokers developed COPD was 2.8% and smokers was 14.1% which means smokers have higher risk of developing COPD compared to non smokers. According to the journals that have been studied, the prevalence of COPD and smoking as the risk factor in male and female is 2653 males and 1257 females. This, concludes than the prevalence of COPD in smoking male patients are more prevalent than in females. The race of patients checked out of 14,619 patients, 1638 were central europeans, 14 were asians, 2 africans and 3 admixed races. Lastly, based on the results that have been collected it has been proven that COPD is prevalent under the consequences of long-term exposure to smoking.

SUGGESTION

For other researchers, it is hoped that they will be able to carry out a follow up analysis about the outcome of the intervention and the prognosis of the risk factors contributing to COPD in elderly men so that it can provide a more informative and complete description of a systematic review.

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