

**KARYA ILMIAH: SEMINAR  
INTERNASIONAL**

**THE CORRELATION BETWEEN OCCUPATIONAL PESTICIDE EXPOSURE  
WITH THE INCIDENCE OF COPD AND CHRONIC BRONCHITIS: A  
SYSTEMATIC REVIEW AND META - ANALYSIS**

**dr. Supangat M.Kes., Ph.D Sp.BA**

**NIP. 197304241999031002**

- Tenaga Pengajar Bagian Paraklinik  
Fakultas Kedokteran Universitas Jember



**KEMENTERIAN RISET, TEKNOLOGI, DAN  
PENDIDIKAN TINGGI  
UNIVERSITAS JEMBER**

---

Karya Ilmiah Dipresentasikan Pada Seminar Internasional:

International Congress on Occupational Health (ICOH)

2022

6 - 10 Februari 2022



**ICOH 2022**

33rd International Congress  
on Occupational Health



**6 - 10 FEBRUARY**

Dear Dr Tohari,

Thank you for submitting your abstract for presentation at the **33rd International Congress on Occupation Health (ICOH 2022)** to be held virtually on 6-10 February 2022.

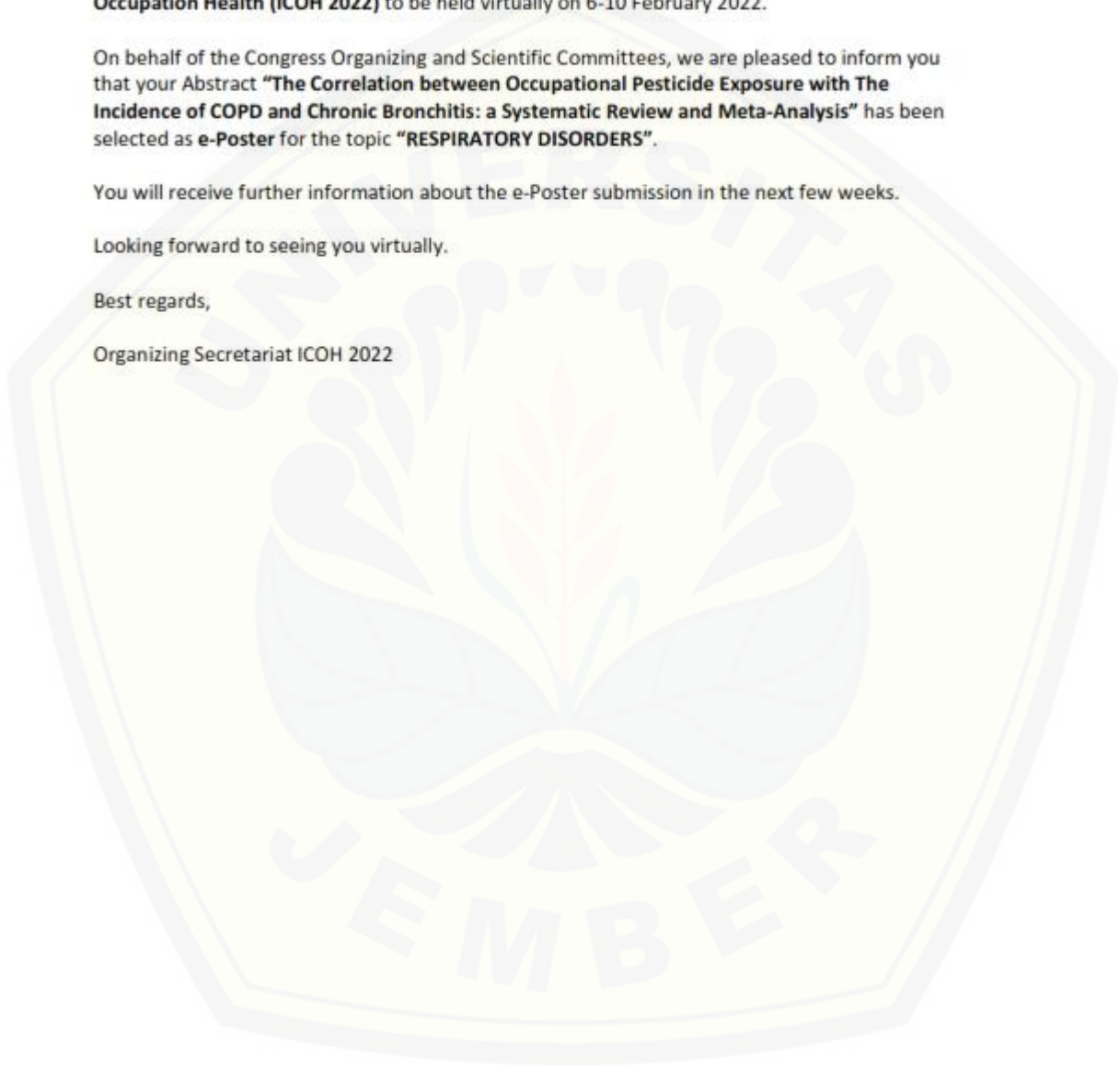
On behalf of the Congress Organizing and Scientific Committees, we are pleased to inform you that your Abstract **"The Correlation between Occupational Pesticide Exposure with The Incidence of COPD and Chronic Bronchitis: a Systematic Review and Meta-Analysis"** has been selected as **e-Poster** for the topic **"RESPIRATORY DISORDERS"**.

You will receive further information about the e-Poster submission in the next few weeks.

Looking forward to seeing you virtually.

Best regards,

Organizing Secretariat ICOH 2022





ScienceDirect

Safety and Health at Work

Volume 13, Supplement, January 2022, Pages S254-S255

## The Correlation between Occupational Pesticide Exposure with The Incidence of COPD and Chronic Bronchitis: a Systematic Review and Meta-Analysis

Achmad Ilham Tohari<sup>1</sup>, Muhammad Yuda Nugraha<sup>2</sup>, Muhammad Rijal Fahrudin Hidayat<sup>1</sup>, Bagus Wahyu Mulyono<sup>1</sup>, Tegar Syaiful Qodar<sup>1</sup>, Elly Nurus Sakinah<sup>3</sup>, Supangat Supangat<sup>1</sup>, Peter Lundqvist<sup>4</sup>

Show more

Share Cite

<https://doi.org/10.1016/j.shaw.2021.12.1546>

Under a Creative Commons [license](#)

[Get rights and content](#)

[Open access](#)

Previous

Next

**Introduction:** Chronic Obstructive Pulmonary Disease (COPD) is being one of the leading types of respiratory disease that being still increasing and expected to become the third leading cause of death by 2030. Approximately 74% of COPD type is chronic bronchitis. Pesticides have been showing to become important risk factors for COPD and chronic bronchitis among farmers.

**Method:** This study was reported based on PRISMA. A literature search was conducted using PubMed, Cochrane Library, scopus, and ScienceDirect. Odds Ratio (OR) with 95% CI were used to determine the odds of pesticide exposure with the case of COPD or chronic bronchitis and control. Random and Fixed effect Model was used based on heterogeneity.

**Result:** A total of 1410 studies was identified from all databases. We included 12 studies in qualitative synthesis and 10 studies were eligible for meta-analysis. The incidence of COPD was significantly higher in terms of insecticide exposure [OR=1.43(1.01,2.01), p=0.0008, I<sup>2</sup>=82%]. However there were no significant difference between the incidence of COPD for unspecified pesticide [OR=1.81(1.16,2.83), p=0.81, I<sup>2</sup>=0%] and herbicide exposure [OR=2.37(1.44,3.91), p=0.37, I<sup>2</sup>=0%]. Moreover there were no significant differences for chronic bronchitis due to insecticide [OR=1.17(1.06,1.28), p=0.72, I<sup>2</sup>=0%], unspecified pesticide [1.56(1.10,2.19), p=0.18, I<sup>2</sup>=41%], herbicide [0.94(0.83, 1.07), p=0.16, I<sup>2</sup>=40%].

**Conclusion:** This meta-analysis provided evidence that insecticide exposure was associated with COPD, but not herbicide and unspecified pesticide. Whereas there were no associations between chronic bronchitis and pesticide.

[Special issue articles](#)

[Recommended articles](#)

[Citing articles \(0\)](#)

Copyright © 2021 Published by Elsevier Korea LLC.



Copyright © 2022 Elsevier B.V. or its licensors or contributors.  
ScienceDirect® is a registered trademark of Elsevier B.V.



The Correlation between Occupational Pesticide Exposure  
with the Incidence of COPD and Chronic Bronchitis: A  
Systematic Review and Meta - Analysis



**ICOH 2022**

33rd International Congress  
on Occupational Health

Achmad Ilham Tohari<sup>1</sup>, Supangat<sup>2</sup>, Elly Nurus Sakinah<sup>2</sup>,  
Muhammad Yuda Nugraha<sup>1</sup>, Muhammad Rijal Fahrudin  
Hidayat<sup>1</sup>, Tegar Syaiful Qodar<sup>1</sup>, Bagus Wahyu Mulyono<sup>1</sup>,  
Peter Lundqvist<sup>3</sup>

<sup>1</sup>PANAH Research Center, Faculty of Medicine, University of Jember, Indonesia

<sup>2</sup>Department of Pharmacology, Faculty of Medicine, University of Jember, Indonesia

<sup>3</sup>Department of People and Society, Swedish University of Agricultural Science, Sweden

6 - 10 February 2022 | Melbourne – Rome Global Digital Congress, Sharing solutions in occupational health through and beyond the pandemic

**STATEMENT SLIDE**



**ICOH 2022**  
33rd International Congress  
on Occupational Health



I have no conflicts of interest to disclose

## INTRODUCTION



### OBJECTIVE

This systematic review and meta-analysis aimed to systematically assess the effect of pesticide exposure according to the type of pesticide with the incidence of COPD and CB.

1. Approximately **34% or 1.1 billion workers** worldwide work in **the agricultural sector**.<sup>(1)</sup>
2. In developing country, there were **lack of pesticide use regulation** specially in agricultural area.<sup>(2)</sup>
3. Study have shown that **pesticide exposure** might play a role as **external exposure** that can lead to the progression of many diseases including chronic obstructive pulmonary disease (**COPD**) and **Chronic Bronchitis**.<sup>(3,4)</sup>

COPD

Chronic Bronchitis



1. De Jong K, Boezen HM, Kromhout H, Vermeulen R, Postma DS, Vank JM, et al. Pesticides and other occupational exposures are associated with airway obstruction: The Lifelines cohort study. *Occup Environ Med*. 2014;71(2):88-96.
2. Nurcandra F, Mahkota R, Wahyono YM. Adverse effect of aerosol pesticide on lung dysfunction among paddy farmers in Purworejo, Central Java, Indonesia. *Kesmas*. 2020;15(2):92-8.
3. Alif SM, Dharmaga SC, Benke G, Dennekamp M, Burgess JA, Perret JL, et al. Occupational exposure to pesticides are associated with fixed airflow obstruction in middle-age. *Thorax*. 2017;72(11):990-7.
4. Hoopin JA, Valcin M, Hennesberger PK, Kullman GJ, Limbach DM, London SJ, et al. Pesticide use and chronic bronchitis among farmers in the agricultural health study. *Am J Ind Med*. 2007;50(12):969-79.

3

## METHODS

1. This review followed the guidelines provided by Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).
2. The included studies were selected based on 2 main criteria:
  - (a) Observational or experimental studies in human
  - (b) the study must consist of the incidence of COPD or CB and all types of pesticide exposure.
3. The Quality assessment for individual study was conducted by The Newcastle-Ottawa Scale (NOS).
4. The outcome results were presented as odds ratio (OR) with 95% confidence of interval (CI) using random-effects model (REM) or fixed-effects model (FEM) forest plot. The heterogeneity level caused by variability data was checked by  $I^2$  statistic and the p-value of the  $\chi^2$  test of heterogeneity.

Database

PubMed

Cochrane Library

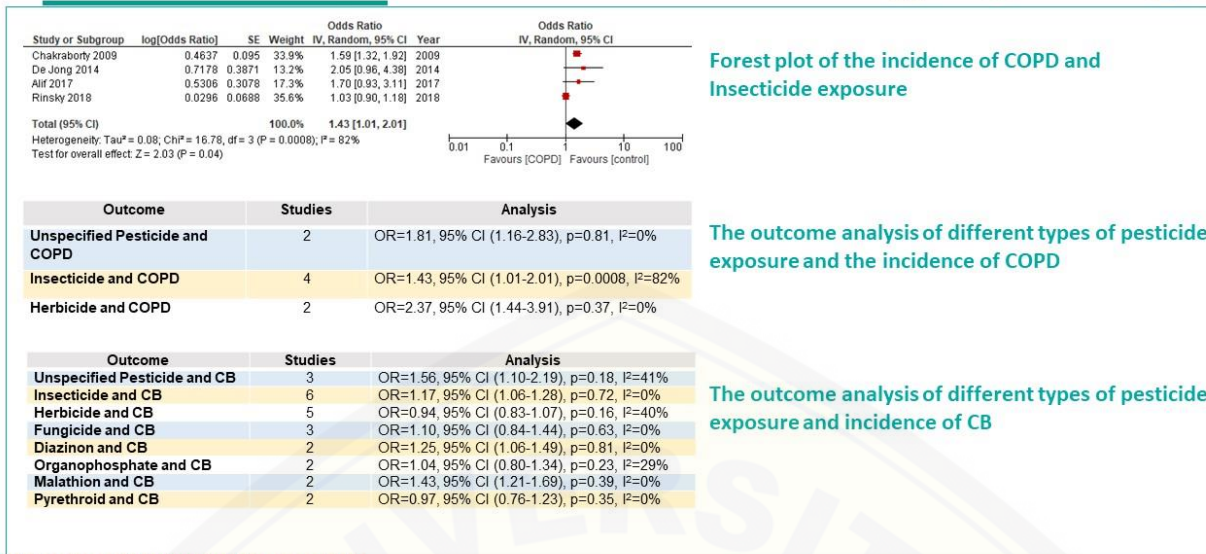
Scopus

ScienceDirect



4

## RESULTS AND DISCUSSION



Forest plot of the incidence of COPD and Insecticide exposure

The outcome analysis of different types of pesticide exposure and the incidence of COPD

The outcome analysis of different types of pesticide exposure and incidence of CB

## CONCLUSION

This meta-analysis provided evidence that **insecticide exposure was associated with COPD, but not herbicide and unspecified pesticide**. Whereas there **were no associations between chronic bronchitis and pesticide**. **More observational or experimental studies are needed** to prove the correlation between pesticide exposure with COPD and CB.

## Acknowledgements

We thank the faculty of medicine University of Jember for giving the guidance and providing place for PANAH Research Center

SCAN HERE FOR

SUPPLEMENTARY FILES



**The Correlation between Occupational Pesticide Exposure with the Incidence of COPD and Chronic Bronchitis: a Systematic Review and Meta-Analysis**

Arifinaldi (Email: arifinaldi123@gmail.com), Sugilaga<sup>1</sup>, Muhammad Rizki Fahrudin Hidayat<sup>2</sup>, Tegar Syaiful Qadri<sup>3</sup>, Bagus Wahyu Mulyono<sup>4</sup>, Peter Limaningsih<sup>5</sup>

<sup>1</sup>PHN Research Center, Faculty of Medicine, University of Jember, Jember, Indonesia  
<sup>2</sup>Faculty of Agriculture, University of Jember, Jember, Indonesia  
<sup>3</sup>Department of Public Health, Sebelah University of Agricultural Sciences, Sebelas, Indonesia

**INTRODUCTION**

Agriculture is one of the most global working forces, approximately 14% of a nation's workforce works in the agricultural sector (1). The usage of pesticides in agricultural sector remains high globally in developing countries due to the lack of pesticide usage regulation (2). Such use often has adverse health impact (3). The chemical exposure that can lead to the progression of many diseases including chronic obstructive pulmonary disease (COPD) and Chronic Bronchitis (CB).

COPD is being one of the leading types of respiratory disease that being well recognized and reported by several the World Health Organization (4). The prevalence of COPD and CB with the exposure of each type of pesticides need to clearly define.

**OBJECTIVE**

This systematic review and meta-analysis aimed to systematically assess the effect of pesticide exposure according to the type of pesticide with the incidence of COPD and CB.

**METHODS**

This review followed the guidelines provided by Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

The literature search was carried out with multiple electronic databases such as PubMed, Cochrane Library, Scopus, and Crossref/Sciendo. The included studies were selected based on a search criteria as observation or experimental studies in human. In the study must consist of the incidence of COPD or CB and all types of pesticide exposure.

The Quality assessment for individual study was conducted by the Newcastle-Ottawa Scale (5).

The outcome results were presented as odds ratio (OR) with 95% confidence interval (CI) using meta-analysis model with a random effect model. The heterogeneity was tested using I<sup>2</sup> test. The statistical significance was checked by Z statistic, and the p-value of the chi test of heterogeneity.

**DISCUSSION**

Of the 11 studies included in qualitative synthesis, only three types of pesticide (organophosphate, insecticide, herbicide) had COPD as major types of pesticide (organophosphate, insecticide, herbicide, fungicide, acaricide, agro-nematocides, molluscicide, and nematocides) (6) were identified.

The incidence of COPD was significantly higher in terms of insecticide exposure (OR: 1.11, 95% CI: 1.02, 1.20). However, there was no significant difference between the incidence of COPD for the exposure of pesticide (CB) (1.11, 95% CI: 0.95, 1.29) and herbicide exposure (1.01, 95% CI: 0.91, 1.12).

Based on the meta-analysis, there were no statistically significant differences for the incidence of CB in all types of pesticide exposure. This might be due to the lack of studies included in each type of pesticide.

Outcomes of all included studies revealed variety result between the association of pesticide exposure with COPD and CB.

From observational or experimental studies included in present the correlation between pesticide exposure with COPD and CB.

**CONCLUSION**

This meta-analysis provide evidence that occupational exposure was associated with COPD, but not herbicide and organophosphate pesticide. However, there were no association between chronic bronchitis and pesticides.

**RESULTS**

**Figure 1. PRISMA Flow Diagram**

Search Strategy	Number of Studies
Initial search	1000
Excluded duplicates	100
Screening titles and abstracts	900
Excluded irrelevant studies	800
Full-text articles screened	100
Excluded irrelevant studies	80
Final included studies	20

**Figure 2. Forest plot of the incidence of COPD and insecticide exposure**

Study	OR	95% CI
Chen (2018)	1.11	1.02 - 1.20
Chen (2019)	1.11	1.02 - 1.20
Chen (2020)	1.11	1.02 - 1.20
Overall	1.11	1.02 - 1.20

**Table 1. The outcome analysis of different types of pesticide exposure and the incidence of COPD**

Pesticide Type	OR	95% CI
Organophosphate	1.11	1.02 - 1.20
Insecticide	1.11	1.02 - 1.20
Herbicide	1.01	0.91 - 1.12
Fungicide	1.01	0.91 - 1.12
Acaricide	1.01	0.91 - 1.12
Agro-nematocides	1.01	0.91 - 1.12
Molluscicide	1.01	0.91 - 1.12
Nematocides	1.01	0.91 - 1.12

**Table 2. The outcome analysis of different types of pesticide exposure and incidence of CB**

Pesticide Type	OR	95% CI
Organophosphate	1.01	0.91 - 1.12
Insecticide	1.01	0.91 - 1.12
Herbicide	1.01	0.91 - 1.12
Fungicide	1.01	0.91 - 1.12
Acaricide	1.01	0.91 - 1.12
Agro-nematocides	1.01	0.91 - 1.12
Molluscicide	1.01	0.91 - 1.12
Nematocides	1.01	0.91 - 1.12

**REFERENCES**

1. Liu JG, Brown GK, Brantford-Williams G, Palmer CL, Stone JH, et al. Pesticides and public health. *PLoS One*. 2017;12(12):e184716.
2. International Labour Organization. The influence of chemical pesticides on farm employment. *Geneva*: International Labour Office; 2013.
3. International Labour Organization. The influence of chemical pesticides on farm employment. *Geneva*: International Labour Office; 2013.
4. World Health Organization. *World Health Statistics Quarterly*. 2019;72(4):661-670.
5. Newcastle DJ, Stewart LA, Greenberg P, et al. The Newcastle-Ottawa Scale for assessing the quality of nonrandomized studies. *BMJ*. 2007;335(7682):n2.
6. International Labour Organization. *World Health Statistics Quarterly*. 2019;72(4):661-670.



THANK YOU

