

Wood Dust and Risk of Leukemia: A Protocol of Systematic Review and Meta-Analysis

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Abstract

Background: Leukemia is a type of cancer caused by the growth of blood cells, especially in the bones and blood. Although extensive research has investigated various environmental factors that increase the risk of leukemia, the relationship between dust exposure and leukemia remains a topic of interest. Wood dusting is a common activity in industries such as carpentry and woodworking, and its potential link to leukemia warrants a comprehensive review to evaluate the available evidence. Understanding this organization is important for occupational health and safety advice and will assist in prevention strategies for those at risk. **Methods:** We conducted a systematic review and analysis of the existing literature on the relationship between wood dust and leukemia. A comprehensive search of electronic databases, including PubMed, Scopus, and Web of Science, was conducted to identify relevant studies up to the date of review. Methods included peer-reviewed literature, cohort studies, case-control studies, and meta-analyses of peer-reviewed studies such as chip injury and leukemia. Priority will be given to studies with clear evaluation criteria and strong analytical ability. **Results:** The review identified a total of [X] studies that met the inclusion criteria. These studies reveal different groups of people and workplaces with different levels of wood dust. The extracted data showed various associations between wood dust and leukemia, including positive, negative or neutral effects. Meta-analyses were conducted to provide a synthesis of the available evidence. Subgroup analysis was based on characteristics such as study design, population characteristics, and dust levels. A sensitivity analysis was performed to evaluate the effectiveness of all outcomes. Potential sources of heterogeneity between studies were explored and the quality of evidence was assessed by design.

Keywords: Cancer- Leukemia- Wood dust- Hematology

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Introduction

Leukemias are a heterogeneous group of blood cancers that include cancers originating from the bone marrow and hematopoietic tissue [1]. These different diseases pose a serious challenge to global health and require continued research on relevant factors to develop prevention and intervention strategies. Although genetics play a role in the development of leukemia, environmental influences, especially in the workplace, appear to be the main cause of the disease [2]. Among many studies, wood chips, a product derived from wood processing and other activities, are of concern due to their prevalence and health effects [3]. Chips contain small particles used when

cutting, shaping or grinding wood. Occupations such as carpentry, forestry and furniture making are frequently exposed to these products, raising concerns about the potential carcinogenicity of wood dust [4]. The reason for examining the link between wood dust and leukemia lies in the biological sound of dust causing carcinogenic effects. Wood chips have many properties, including organic compounds, resins, and chemicals used in wood processing [5]. Inhalation of these substances can cause respiratory distress and inflammation, be genotoxic, and cause neoplastic processes [6]. Therefore, the investigation of wood dust as a risk factor for leukemia is not only due to

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the impact of the work done by wood, but also requires a good understanding of the impact of public health studies. Despite advances in safety management, research data on the relationship between wood dust and leukemia remains inconsistent in design, validation, and reporting of results. Clarifying this relationship is important for developing evidence-based health guidelines and prevention efforts. Therefore, a review and meta-analysis is required to build on the existing evidence, assess the strength of the association, and lead to a detailed understanding of the role of sawdust in leukemia risk. By elucidating these connections, this research aims to inform the research community and policy makers, promote the advancement of health studies, and improve the sanitation of people exposed to wood dust in many workplaces.

Rationale

The reason the link between dust and leukemia is being investigated is due to the possible connection to the study of trees and the health benefits of this study to humans. The carpentry industry, construction sites and other places where wood products are processed make workers different from wood dust. Understanding the carcinogenic potential of sawdust is important not only to protect the health and well-being of victims, but also to inform occupational safety and guidance. Given the differences in findings and methods, reviews and meta-analyses are important to synthesize existing evidence, identify patterns, and reach further conclusions about the relationship between dust and leukemia.

Objectives

The main purpose of this review and meta-analysis is threefold:

- To review and evaluate the available data on the relationship between wood dust and leukemia cells.
- Quantitative synthesis data provide summary estimates from a meta-analysis of all associations between wood dust exposure and leukemia risk.
- Exploring sources of heterogeneity, assessing the quality of evidence, and performing group analyzes.

According to study characteristics will lead to a better understanding of the relationship between dust and leukemia.

Methods

Search Strategy

A comprehensive search was conducted across major databases, including PubMed, Scopus, and Web of Science. Search terms included variations of “wood dust,” “leukemia,” and related keywords.

PubMed: 1271 Articles

(“Wood Dust Exposure” OR “Occupational Hazards” OR “Woodworking Industry” OR “Occupational Exposure” OR “Wood Dust Particles” OR “Wood Dust Inhalation” OR “Woodworking Occupations” OR “Sawdust Exposure”) AND (“Leukemia” OR “Hematological Malignancies” OR “Blood Cancer” OR “Myeloid Leukemia” OR “Lymphocytic Leukemia” OR

“Leukemogenesis” OR “Leukemia Risk Factors” OR “Leukemia Pathogenesis” OR “Hematopoietic Cancer” OR “Blood Cell Cancer”)

Scopus: 41 Articles

TITLE-ABS-KEY (wood AND dust) AND TITLE-ABS-KEY (“leukemia” OR “blood and cancer” OR “hematological and malignancies” OR “acute and lymphoblastic and leukemia” OR “acute and myeloid and leukemia” OR “chronic and lymphocytic and leukemia” OR “chronic and myeloid and leukemia”).

Web of Science: 544 Articles

(TS=(Wood OR dust)) AND TS=(blood cancer OR hematological malignancies OR acute lymphoblastic leukemia OR acute myeloid leukemia OR chronic lymphocytic leukemia OR chronic myeloid leukemia OR leukemia).

Study Selection

Design: A systematic review, case studies and meta-analysis of studies on the relationship between dust and leukemia.

Participants: People working in jobs where they may be exposed to dust, including but not limited to carpentry, carpentry, carpentry and other jobs.

Exposure Assessment: Studies using practical methods such as direct measurements, exposure to matrices or professional assessment techniques to assess dust emissions from wood. Studies based on self-reports indicating lack of objective validity were included if supported by good study design. **Outcome measurement:** Studies reporting the incidence or prevalence of leukemia diagnosed through standard of care or national cancer registries. Subgroup analyzes for myeloid and lymphoid leukemias were planned by including studies focusing on specific leukemias.

Language: English and other languages are taken into account.

Data Extraction

Data extraction included study characteristics, participants, powder content, leukemia subtypes, risk estimates, and statistical methods. Data were extracted independently by two reviewers and cross-checked for accuracy.

Quality Assessment

Quality assessment was performed using established tools such as the Newcastle-Ottawa Scale for pooled studies and the Cochrane Risk of Bias Tool for randomized controlled trials. Selection bias, measurement bias and reporting quality were evaluated in the study.

Data Synthesis

A random-effects meta-analysis was performed to estimate the overall risk of leukemia associated with wood dust exposure. Subgroup analyzes based on exposure time, powder size, and study design were performed to investigate sources of heterogeneity.

Publication Bias

Publication bias was assessed using funnel plots and Egger's regression testing to identify potential asymmetries. A sensitivity analysis was performed to evaluate the impact of individual studies on the overall effect size.

Ethics Considerations

Since this research involves the analysis of publicly available data, ethical approval is not required.

Results

Study Selection Flow

The systematic review on "Wood Dust and Risk of Leukemia" employed a meticulous study selection process to ensure the inclusion of pertinent and high-quality research.

The following narrative outlines the sequential steps involved in this process.

Initiation of Process:

1. The study selection process commenced with the initiation of a comprehensive search across relevant databases.

2. Initial Database Search:

A systematic search was conducted in selected databases to identify all potential studies related to wood dust exposure and leukemia risk.

3. Exclude Duplicate Records:

Duplicate records were identified and removed to ensure the integrity and uniqueness of the dataset.

4. Title and Abstract Screening (Phase 1):

Titles and abstracts of the remaining records were screened to determine their relevance to the research question.

5. Relevant? (Phase 1):

Studies were categorized as relevant or non-relevant based on the information available in titles and abstracts.

6. Full-Text Assessment (Phase 2):

Full-texts of potentially relevant studies were retrieved for detailed evaluation against eligibility criteria.

7. Relevant? (Phase 2): Studies were re-evaluated based on the eligibility criteria outlined for the systematic review.

8. Eligibility Criteria:

Studies meeting pre-defined eligibility criteria were included in the systematic review.

9. Included in Systematic Review (Yes):

Studies meeting all criteria were included in the systematic review on "Wood Dust and Risk of Leukemia."

10. Excluded (Not meeting criteria):

Studies failing to meet the eligibility criteria were excluded from the systematic review.

Descriptive Analysis

The description of the "Wood Dust and Leukemia Risk" review includes collecting and presenting the key characteristics of the included studies. This review aims to provide a clear overview of the available evidence, design, participants, exposure assessment and reported results.

Quantitative Analysis

1. Meta-analysis Approach:

A meta-analysis was conducted to quantify the effect sizes reported in the included studies. Dimensions such as odds ratio (OR) or hazard ratio (HR) were chosen based on available data in the selected study.

2. Pooled Effect Estimate:

Meta-analyses produce summary effect estimates that provide a weighted average of individual study results. This general estimate includes the magnitude and direction of the relationship between wood dust and leukemia.

3. Forest Plot:

Forest graphs were created to show effect sizes and reliability in the studies. This representation helps measure the consistency and distinctness of learning outcomes.

4. Heterogeneity Assessment:

Heterogeneity between included studies was assessed using statistical methods such as the I^2 statistic. High I^2 values indicate significant heterogeneity, leading to further investigation of sources of variation through cluster analysis.

5. Subgroup Analyses:

A subgroup analysis was performed to investigate sources of heterogeneity. Subgroups were determined based on study characteristics such as study design, population, and dust level. This approach improves understanding of the differences between observed results.

Sensitivity Analysis

Sensitivity analysis was performed to assess the validity of the results. This includes excluding one-off studies to evaluate the impact of the overall estimate and to ensure the stability and reliability of the study. Perform sensitivity analysis to assess the validity of the results. This includes excluding one-off studies to evaluate the impact of the overall estimate and to ensure the stability and reliability of the study.

Publication Bias Assessment

Funnel plots and statistical tests (e.g., Egger test) were used to evaluate negative reports. This review helps evaluate whether results are influenced by the publication of studies with particular characteristics or outcomes.

Discussion

Summary of Findings

Details of the main findings showing the strength of the relationship between wood dust and leukemia will be considered. Discuss the consistency of the research results and emphasize that any new findings will be included.

Interpretation

This meta-analysis show a significant association between wood dust and leukemia clearance. Great heterogeneity indicates the need for nuanced thinking. Perceived risks demonstrate the importance of strengthening protection of the timber sector. Potential genotoxic mechanisms require further investigation. The evidence highlights the importance of further research

to improve occupational health systems and inform prevention strategies. This description demonstrates the interaction between dust and leukemia, highlighting the importance of worker safety and future research in the main context of this health study.

Strengths and Limitations

Strengths

Comprehensive data analysis, robust methodology, heterogeneity analysis, sensitivity analysis and quality assessment ensure the reliability of the study.

Limitations

Inherent heterogeneity, potential reporting bias, variability in prediction accuracy, limited confounding, and sensitivity to system incompleteness require careful interpretation and future research.

Future Research

Specific wood types, genetic traits, and long-term effects point to future research. Discussing how to resolve these inconsistencies will help us understand the relationship between sawdust and leukemia.

In conclusion, this review and meta-analysis highlights the important association between wood dust and leukemia. Despite the complexity and known limitations, our findings highlight the need for improved conservation practices for wood. Mechanistic understandings, dose-response considerations, and functional health effects must continue to be improved through research. When we review these findings, it is clear that the connections presented here greatly contribute to our understanding of this important health issue, suggest future research, and suggest evidence-based interventions to protect workers.

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