



USE OF CHEMICAL PRESERVATIVES AND HEALTH HAZARDS IN THE UNIVERSITY LIBRARIES IN TELANGANA

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Abstract

This study explores the use of chemical preservatives in university libraries across Telangana and the health hazards associated with their application. Libraries often rely on chemicals such as formaldehyde, naphthalene, and boric acid to preserve books, manuscripts, and archival materials. While these substances serve to protect collections from pests, mold, and environmental deterioration, they also pose significant health risks to library staff and frequent users, particularly when used without adequate safety measures. The research investigates the types of chemicals commonly used, the extent of health issues reported by staff, existing safety practices, and awareness levels regarding chemical exposure. By comparing local practices with international preservation standards, the study highlights the urgent need for safer alternatives and the implementation of effective occupational safety policies. Recommendations are provided to support sustainable preservation practices and to promote a healthier working environment in academic libraries.

Keywords: *Chemical preservation, university libraries, Telangana, health hazards, formaldehyde, library staff safety, archival preservation, toxic exposure, fumigation, preservation policy.*

1. Introduction

Preservation of books, manuscripts, and archival materials is a fundamental function of university libraries. Over time, these materials are prone to damage from environmental factors such as humidity, temperature fluctuations, pests, and fungal growth. To combat this degradation and extend the life of resources, libraries often rely on chemical preservatives like fungicides, insecticides, and disinfectants. These chemicals are applied during book restoration, fumigation, or routine maintenance processes.

In Telangana, a state with a rich academic and cultural heritage, university libraries house a significant volume of rare manuscripts, old books, and academic resources. Many of these materials are irreplaceable and require constant care. As a result, preservation techniques using chemicals have become an integral part of library maintenance in institutions such as Osmania University, Kakatiya University, and other universities.

However, the frequent and often unregulated use of chemical preservatives raises serious concerns about occupational and environmental health. Library staff who handle these chemicals, often without proper training or protective equipment, may be exposed to hazardous substances that can lead to short-term and long-term health complications, including respiratory issues, skin problems, and other chronic illnesses. Furthermore, students and users who spend extended periods in these spaces might also be indirectly affected by residual chemical vapors or poorly ventilated conditions.



Despite the growing concern over chemical hazards in various workplaces, limited research has been conducted in the context of university libraries in India, particularly in Telangana. This study seeks to address this gap by exploring the types of chemical preservatives used, the awareness levels among library staff and administrators, and the existing safety measures in place to protect individuals from exposure.

2. Need of the Study

The necessity of this study emerges from several pressing factors:

1. **Increasing Use of Chemicals in Libraries:** With growing concerns over the deterioration of books and documents, many libraries have increased their use of chemical treatments. However, there is often little monitoring or regulation of the type and quantity of chemicals used, which can pose serious health threats.
2. **Lack of Awareness and Training:** Many library personnel may not be adequately trained in the safe handling and application of chemical preservatives. Awareness about the health risks associated with exposure to these substances is often minimal or overlooked.
3. **Health Hazards and Workplace Safety:** There is a growing body of evidence linking chemical exposure to various health issues. In the context of libraries, where exposure may be low-level but continuous, there is a need to investigate the cumulative impact on staff health and overall workplace safety.
4. **Policy Gaps and Need for Regulation:** There is a lack of clear policies or standardized guidelines related to the safe use of chemical preservatives in educational institutions. This study can help inform policy recommendations and promote safer preservation alternatives.
5. **Environmental and User Safety:** Libraries are public spaces frequented by students, researchers, and faculty. Ensuring that these environments are safe, well-ventilated, and free from harmful chemical residues is essential for the health of all users.
6. **Contribution to Library Science and Public Health:** This study not only contributes to the field of library and information science but also intersects with public health concerns. It highlights the importance of integrating occupational health and safety within the library ecosystem.

3. Objectives of the Study

The primary aim of this study is to investigate the use of chemical preservatives in university libraries across Telangana and to understand their potential health impacts. The specific objectives of the study are as follows:

- **To identify the types of chemical preservatives** currently used in university libraries in Telangana for the preservation of books, manuscripts, and archival materials.
- **To assess the health hazards** associated with exposure to these chemical preservatives among library staff and users, including both short-term symptoms and long-term effects.
- **To explore existing safety measures and the level of awareness** among library personnel regarding the risks posed by chemical preservatives, as well as their knowledge of best practices in handling them.

- **To suggest potential safer preservation methods and improved practices** that minimize or eliminate the use of harmful chemicals while maintaining the integrity of library collections.

Chemical Usage in University Libraries

The preservation of books, manuscripts, and archival documents in university libraries often involves the application of various chemical agents designed to protect materials from biological degradation, such as fungal growth, insect infestation, and acidic deterioration. In the context of Telangana, where university libraries house aging and valuable academic resources, chemical preservation remains a widely practiced method—often due to limited access to modern conservation technologies.

Commonly Used Chemicals

Preliminary investigations and existing literature suggest that the following chemicals are frequently used in university libraries in Telangana:

- **Formaldehyde:** Commonly used in fumigation chambers to disinfect rare books and manuscripts. While effective in eliminating mold and pests, formaldehyde is a known carcinogen and poses serious risks to respiratory health.
- **Naphthalene Balls (Mothballs):** Often placed in storage areas to deter insects. Prolonged exposure can lead to nausea, headaches, and in severe cases, liver damage.
- **Camphor:** Used as a traditional repellent in many libraries, especially for manuscript collections. While less harmful than other chemicals, inhalation in poorly ventilated spaces may cause dizziness or irritation.
- **Boric Acid and Borax:** Used as antifungal agents to treat book bindings and pages. While effective, they can cause skin and eye irritation upon contact.
- **Ethylene Oxide and Carbon Disulfide:** Occasionally used for pest control through fumigation. These chemicals are toxic and require controlled environments, though in some cases, proper handling protocols are not strictly followed.

Trends in Chemical Usage

There is a noticeable dichotomy in chemical usage trends within university libraries in Telangana:

- **Traditional Chemicals Still Dominant:** Despite the health concerns, many libraries still rely heavily on traditional chemicals like naphthalene and formaldehyde due to their availability, low cost, and lack of alternatives. Many preservation practices are inherited or passed down informally and are not updated with recent safety standards.
- **Lack of Transition to "Green" Alternatives:** While the global trend in preservation science is shifting toward non-toxic and environmentally friendly (“green”) methods—such as using dehumidifiers, controlled temperature storage, and natural repellents—adoption in Telangana is slow. Budget constraints, lack of training, and limited access to modern materials have hindered this transition.
- **Informal Application Practices:** Often, chemicals are applied without proper measurement, protective equipment, or ventilation. This informal approach not only reduces effectiveness but increases the health risk for library staff and users.

The findings highlight a critical need for awareness and updated practices in chemical usage for library preservation. Many university libraries in Telangana continue to use older,

potentially hazardous chemicals due to tradition, limited funding, and insufficient access to newer, safer alternatives. There is a pressing need for education, training, and policy intervention to support a gradual shift toward safer, non-toxic preservation methods.

Health Hazards Identified

The use of chemical preservatives in university libraries, while essential for the preservation of aging documents and manuscripts, has raised growing concerns about their impact on human health. Library staff, who are often in prolonged contact with these substances, are at significant risk due to frequent exposure—sometimes without adequate protection or ventilation. Users, including students and researchers who spend long hours in these environments, may also be indirectly affected. The health hazards associated with these chemicals range from mild irritation to serious chronic conditions, depending on the level and duration of exposure.

Common Health Issues Among Library Staff

Based on field observations, interviews, and previous research, the following health complaints are frequently reported among library personnel:

- **Respiratory Problems:** A large number of library staff report symptoms such as persistent coughing, wheezing, shortness of breath, and nasal congestion. These issues are particularly common in environments where fumigation with formaldehyde or ethylene oxide has been carried out without proper ventilation.
- **Allergic Reactions:** Skin rashes, irritation, itching, and eye redness are often observed in staff who handle books treated with boric acid, camphor, or naphthalene. Some staff also experience sneezing or watery eyes, which can escalate into chronic allergic rhinitis.
- **Headaches and Dizziness:** Poorly ventilated storage areas or offices with residual fumes from fumigants often contribute to complaints of headaches, dizziness, and fatigue. Staff report these symptoms intensify during or after fumigation sessions or when cleaning large batches of preserved materials.
- **Skin Conditions:** Direct handling of preserved materials without gloves can cause dry skin, dermatitis, or chemical burns in more severe cases. This is especially true when dealing with fungicidal solutions or adhesives mixed with chemical additives.

Potential Long-Term Effects and Chronic Exposure Risks

In addition to immediate or short-term symptoms, prolonged exposure to certain chemical preservatives poses more severe health risks:

- **Carcinogenic Risks:** Chemicals like formaldehyde and ethylene oxide are classified as carcinogens by international health agencies (IARC, WHO). Long-term exposure has been linked to increased risk of cancers, particularly of the respiratory system and nasopharynx.
- **Neurological Effects:** Chronic exposure to solvents and fumigants (such as carbon disulfide) can potentially lead to neurological issues including memory loss, decreased cognitive function, and mood disturbances.
- **Lung Disorders:** Long-term inhalation of chemical fumes may contribute to the development of chronic bronchitis, asthma, or even irreversible lung damage, particularly among those working in poorly ventilated or enclosed environments.



- **Reproductive Health Concerns:** Though under-researched in the Indian context, global studies suggest that continuous exposure to certain preservation chemicals could impact reproductive health, causing fertility issues or birth defects, especially among female staff.

The findings point to a clear correlation between chemical preservative use and the health issues reported by library staff. Many of these health problems are preventable and are exacerbated by poor handling practices, lack of protective gear, inadequate training, and insufficient safety infrastructure. Addressing these concerns requires a two-pronged approach: improving awareness and training among staff, and transitioning to safer, less hazardous preservation methods.

Safety Measures

The use of chemical preservatives in library preservation processes necessitates the implementation of robust safety protocols to protect both staff and users. However, in the university libraries of Telangana, the safety infrastructure surrounding chemical usage is often insufficient or inconsistently applied. This section explores the current state of safety measures, including ventilation systems, protective equipment, and training programs, along with the overall level of awareness among library staff regarding chemical safety.

Current Safety Measures in Place

1. **Ventilation Systems:** Proper ventilation is a critical component in mitigating the risks of chemical exposure. While a few larger university libraries—such as those in Hyderabad and Warangal—have implemented basic ventilation systems, many smaller or rural institutions still lack proper air circulation, particularly in basement storage rooms or older building wings. Fumigation is often conducted in enclosed rooms without adequate airing-out procedures, increasing the risk of inhalation hazards.
2. **Protective Equipment:** Personal Protective Equipment (PPE), such as gloves, masks, goggles, and lab coats, is either unavailable or underutilized in most libraries surveyed. Even when gloves and masks are supplied, there is often no training on how to use them correctly or how frequently they should be replaced. As a result, staff members are often exposed to harmful chemicals during the application of fungicides or while handling fumigated books and documents.
3. **Training on Chemical Safety:** Formal training on chemical handling and preservation safety is minimal in most institutions. Staff, particularly those involved in maintenance or document preservation, typically learn through informal methods or trial and error. Only a few universities have conducted workshops or awareness programs on chemical safety—usually as a one-time initiative rather than as part of ongoing professional development.
4. **Storage and Labelling of Chemicals:** In some libraries, chemicals are stored without proper labelling or documentation regarding their hazards. Safety Data Sheets (SDS), which provide critical information on the handling and emergency response for chemicals, are often missing or ignored. Improper storage—such as placing chemicals near electrical outlets or in unventilated cabinets—further increases the risk of accidents.

Awareness Among Library Staff

Interviews and survey responses indicate that **awareness levels about chemical hazards and safety regulations among library staff are generally low**. Many staff members are unaware of the long-term health risks posed by substances such as formaldehyde, boric acid, and naphthalene. Few are familiar with national or international safety guidelines, such as those provided by the Occupational Safety and Health Administration (OSHA) or the Indian Directorate General, Factory Advice Service and Labour Institutes (DGFASLI).

Moreover, there is often a **disconnect between library management and ground-level staff** regarding safety protocols. While administrators may assume certain measures are in place, the actual implementation is often poor due to lack of supervision, budget constraints, or insufficient manpower.

The findings reveal that while there may be some awareness of the dangers associated with chemical preservatives, **actual safety measures in place are often inadequate or inconsistently practiced**. There is a pressing need to develop institutional policies that prioritize staff training, regular health check-ups, proper chemical handling procedures, and the provision of safety equipment. Only through structured intervention can the long-term health and safety of library workers and users be ensured.

Comparison with Global Practices

Preservation of books, manuscripts, and archival materials is a universal concern, but the methods and safety standards adopted vary greatly across regions. In Telangana, university libraries continue to rely heavily on traditional chemical-based preservation techniques. When compared to international best practices, several gaps become apparent—both in terms of the chemicals used and the safety protocols followed. This section explores those differences and provides actionable recommendations to bridge them.

Current Practices in Telangana vs. Global Standards

1. Reliance on Traditional Chemicals vs. Green Alternatives

In Telangana, many libraries continue to use chemical agents such as formaldehyde, naphthalene, and boric acid due to their availability and low cost. In contrast, **international preservation practices are moving toward eco-friendly and non-toxic alternatives**. For example:

- **Freezing methods** are used in the U.S. and Europe to kill pests without chemicals.
- **Integrated Pest Management (IPM)** strategies, which focus on monitoring and controlling pests through environmental adjustments, are preferred over direct chemical application.
- **Deacidification processes** using safer compounds (e.g., Bookkeeper® solution) are now commonly used in Western archival institutions.

2. Safety Standards and Compliance: Institutions like the **Library of Congress (USA)** and the **British Library (UK)** follow stringent Occupational Health and Safety Administration (OSHA) or equivalent guidelines. These include:

- Detailed chemical handling protocols.
- Mandatory staff training on chemical use and emergency procedures.
- Use of specialized fume hoods and chemical storage cabinets.

- Regular health check-ups for employees handling preservation chemicals.
- In contrast, libraries in Telangana often lack formal **safety audits, training programs, or chemical inventory management systems**. This absence of a structured safety framework places staff at risk.
3. **Technology and Infrastructure:** Globally, digitization is a key strategy to reduce reliance on chemical preservation. High-resolution scanning and digital archiving help preserve the content of deteriorating materials while minimizing chemical exposure. In Telangana, digitization efforts are still in early stages, and lack of funding and trained personnel hinder progress.

Recommendations for Telangana University Libraries

To align more closely with global best practices and ensure the health and safety of library staff and users, the following measures are recommended:

1. **Adopt Non-Chemical and Safer Preservation Methods**
 - Implement **Integrated Pest Management (IPM)** approaches.
 - Use **freeze-drying** or **vacuum-freezing** methods for pest control.
 - Transition to **non-toxic fungicides and deacidification solutions** approved for archival use.
2. **Strengthen Safety Infrastructure**
 - Install **ventilation systems and fume hoods** in preservation areas.
 - Provide **mandatory PPE (Personal Protective Equipment)** for staff.
 - Develop **standard operating procedures (SOPs)** for chemical usage, handling, and disposal.
3. **Training and Awareness**
 - Conduct **regular workshops and seminars** on chemical safety, health hazards, and global preservation techniques.
 - Display **safety signage and instructions** in all preservation and storage areas.
4. **Policy and Monitoring**
 - Establish **institutional preservation and safety policies** in alignment with international standards.
 - Maintain **Material Safety Data Sheets (MSDS)** for all chemicals used.
 - Conduct **periodic safety audits** and **health screenings** for library staff.
5. **Promote Digitization and Conservation Projects**
 - Invest in **digitization infrastructure** to reduce dependency on physical preservation.
 - Collaborate with national and international organizations for funding and technical support.

While Telangana's university libraries play a crucial role in preserving valuable academic and historical resources, the current reliance on traditional chemical methods—without adequate safety protocols—poses serious health and environmental risks. Learning from and gradually adopting global best practices will not only enhance preservation outcomes but also ensure a safer and more sustainable work environment for library professionals.

Key Findings

This study highlights critical insights into the chemical preservation practices and associated health risks in university libraries across Telangana. Based on field observations, surveys, and available documentation, several key findings emerged:

1. Common Chemicals in Use

University libraries in Telangana continue to rely on traditional and low-cost chemical agents for preservation purposes. The most commonly used substances include:

- **Formaldehyde** – used in fumigation processes; highly toxic and a known carcinogen.
- **Naphthalene** – widely used in book stacks to deter insects; linked to respiratory issues and headaches.
- **Camphor and Boric Acid** – used in manuscript preservation and pest control; can cause skin and eye irritation.
- **Ethylene Oxide and Carbon Disulfide** – occasionally used in larger institutions for deep fumigation, though without proper containment facilities.

These chemicals, while effective in preservation, pose significant risks to human health, especially when used without strict safety protocols.

2. Health Risks Identified

- Library staff reported a range of **short-term health issues** such as respiratory discomfort, allergic reactions, headaches, dizziness, and skin irritation.
- There is potential for **long-term health complications**, including asthma, chronic bronchitis, neurological issues, and increased cancer risk due to cumulative exposure to carcinogenic agents like formaldehyde and ethylene oxide.
- **Lack of awareness** among staff has contributed to underreporting and misattribution of health symptoms.

3. Safety Measures and Gaps

- Safety practices are either minimal or inconsistently applied. Basic measures like ventilation and use of PPE (masks, gloves) are missing in many institutions.
- There is **no structured chemical handling policy**, and most staff lack formal training in chemical safety.
- The majority of libraries do not maintain **Material Safety Data Sheets (MSDS)** or conduct **periodic health screenings** for staff exposed to preservation chemicals.
- Current measures are largely reactive, and there is a **pressing need for proactive safety planning, staff training, and policy development**.

Suggestions for Further Research

To build on the findings of this preliminary study and gain a more comprehensive understanding of the issue, the following research avenues are recommended:

1. Larger-Scale Studies Across India

A broader study involving university and public libraries across different states can:

- Compare preservation practices regionally.
- Identify national trends and common safety gaps.
- Influence policy at both state and central government levels through evidence-based recommendations.

2. Longitudinal Health Impact Studies

There is a clear need for long-term studies that:

- Track the health of library staff over several years.
- Examine the cumulative effects of low-level chemical exposure.
- Use medical diagnostics and occupational health assessments to establish direct health correlations.

3. Evaluation of Green Alternatives

Further studies can assess the effectiveness of **non-chemical preservation techniques**, such as:

- Freezing and vacuum sealing.
- Controlled humidity and temperature storage.
- Natural repellents and integrated pest management (IPM).

Conclusion

The preservation of books and manuscripts is a crucial responsibility of university libraries, especially in a knowledge-rich region like Telangana, where academic and cultural heritage must be protected for future generations. However, this study reveals that the continued reliance on traditional chemical preservatives—such as formaldehyde, naphthalene, and boric acid—poses significant health risks to library staff and users alike.

Through surveys, field observations, and comparative analysis, the research highlights not only the widespread use of hazardous chemicals but also the limited awareness and inadequate safety infrastructure within many university libraries. Common health issues such as respiratory problems, allergic reactions, headaches, and skin irritation are frequently reported by library personnel, with potential long-term consequences that remain under-assessed and underreported. Safety measures, where they exist, are often minimal, inconsistently applied, and lack alignment with international best practices.

In contrast, global library and archival institutions are increasingly adopting non-toxic, eco-friendly preservation techniques and integrating occupational health standards into their preservation protocols. Telangana's libraries can benefit greatly by moving in a similar direction—implementing safer preservation methods, enhancing staff training, improving ventilation and protective measures, and promoting digitization to reduce physical handling of aging materials.

This study, while limited in scope, underscores the urgent need for a policy shift towards sustainable and safe preservation practices in Indian academic institutions. It calls for institutional commitment, government support, and further academic research to ensure that the act of preserving knowledge does not come at the cost of human health.

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