



Original Research Article

EFFECTIVENESS OF A PLANNED TEACHING PROGRAMME ON KNOWLEDGE REGARDING FARMER'S LUNG AND ITS PREVENTION AMONG FARMERS IN RURAL ODISHA, INDIA: A PRE-EXPERIMENTAL STUDY

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Received XX/XX/2026	ABSTRACT
Received in revised form: XX/X/2026	Background: Agricultural workers are routinely exposed to organic dust, moulds, fungi, microbial bioaerosols, and other respiratory hazards. Farmer's lung is an occupational form of hypersensitivity pneumonitis associated with repeated inhalation of antigenic material from mouldy hay, grain, and other agricultural products. Although exposure reduction is central to prevention, awareness of occupational respiratory hazards among farming communities may be limited. This study evaluated the effectiveness of a structured planned teaching programme on knowledge regarding farmer's lung and its prevention among farmers in rural Odisha, India.
Accepted XX/X/2026	Materials and Methods: An evaluative, one-group pretest–post-test study was conducted among 100 farmers from Madhiapali Village, Balangir District, Odisha, India, from October 7 to October 27, 2024. Participants were selected using systematic random sampling. Baseline demographic characteristics and knowledge regarding farmer's lung were assessed using a structured 30-item knowledge questionnaire. A planned teaching programme covering disease concepts, occupational exposure, clinical manifestations, diagnosis, prevention, and basic management was subsequently delivered. A post-test was conducted on the eighth day. Descriptive statistics, paired t-test, and chi-square test were used for analysis.
Corresponding Author: Mr. Purandar Sahu, Assistant Professor, Community Health Nursing, Bhagabati Kousalya College of Nursing, Balangir, Odisha, India Email: purandarsahu125@gmail.com	Results: At baseline, 86 participants (86.0%) had inadequate knowledge and 14 (14.0%) had moderate knowledge; none had adequate knowledge. The mean pretest knowledge score was 11.54 ± 3.97 out of 30 (38.4%). Following the intervention, the mean score increased to 18.60 ± 5.24 (62.0%), representing a mean gain of 7.06 points. The difference between pretest and post-test scores was statistically significant (paired $t = 20.21$, $p < 0.001$). At post-test, 28 participants (28.0%) had inadequate knowledge, 56 (56.0%) had moderate knowledge, and 16 (16.0%) had adequate knowledge. Baseline knowledge was significantly associated with educational qualification and monthly income.
Source of Support: Nil, Conflict of Interest: None declared	Conclusions: The planned teaching programme was associated with a significant improvement in knowledge regarding farmer's lung and its prevention. Community-based occupational respiratory health education may be a feasible component of preventive health services for farming populations. However, controlled studies with larger samples and longer follow-up are required to determine whether improvements in knowledge translate into sustained exposure-reduction practices and improved respiratory health.
	(Key Word: - farmer's lung; hypersensitivity pneumonitis; farmers; occupational health; organic dust; health education; respiratory health; rural India; knowledge; community health nursing

INTRODUCTION

Agriculture remains an important source of employment and livelihood in India, particularly in rural communities. However, agricultural work involves exposure to a

complex mixture of biological and chemical hazards, including organic dust, fungal spores, bacteria, endotoxins, plant particles, animal-derived materials, pesticides, and irritant gases. Occupational exposure to organic dust has been associated with several respiratory disorders,

including asthma, chronic bronchitis, chronic obstructive pulmonary disease, hypersensitivity pneumonitis, and other inflammatory airway conditions. (1,2)

Farmer's lung is a well-recognized occupational form of hypersensitivity pneumonitis caused by repeated inhalation of organic antigens, particularly those originating from mouldy hay, grain, and other agricultural materials. Hypersensitivity pneumonitis is an immune-mediated interstitial lung disease that occurs in susceptible individuals following inhalation of an inciting antigen. Contemporary clinical frameworks distinguish nonfibrotic and fibrotic phenotypes, reflecting differences in disease course, prognosis, and management. (3–5)

The diagnosis of hypersensitivity pneumonitis requires integration of exposure history with clinical, radiological, immunological, and, where appropriate, bronchoalveolar lavage or histopathological findings. Current guidelines emphasize the importance of obtaining a detailed environmental and occupational exposure history because identification of the causative antigen can increase diagnostic confidence and inform exposure avoidance. (3,6)

Agricultural workers may experience multiple simultaneous occupational exposures, making respiratory disease prevention particularly challenging. Occupational hypersensitivity pneumonitis has been associated with a variety of agricultural and plant-material exposures. (7) Organic dust is a complex bioaerosol containing bacteria, fungi, plant material, animal-derived components, and other biological constituents, and cumulative exposure may contribute to several respiratory diseases. (1)

Despite the established relationship between agricultural work and respiratory hazards, awareness of occupational lung health among farming populations remains insufficiently studied. A scoping review of lung health in farming identified substantial evidence regarding respiratory symptoms, occupational exposures, and respiratory disease but also highlighted gaps in research addressing farmers' awareness and knowledge of respiratory health. (2)

This knowledge gap has practical implications. Prevention and management of hypersensitivity pneumonitis depend substantially on identification and reduction of exposure to the causative antigen. Contemporary clinical guidance continues to emphasize antigen avoidance as an important component of management. (4,5,9) In farming communities, however, exposure reduction may be difficult because agricultural activities are closely linked to livelihood, seasonal work, and socioeconomic circumstances.

Health education therefore represents a potentially important component of occupational disease prevention. Community health nurses and other primary healthcare professionals can contribute by increasing awareness of occupational respiratory hazards, promoting safer handling and storage of agricultural materials, recognizing

symptoms suggestive of respiratory disease, encouraging appropriate respiratory protection, and facilitating referral for medical evaluation when necessary.

Although farmer's lung is a clinically important occupational condition, evidence concerning educational interventions directed specifically at farmers remains limited. The present study was therefore undertaken to assess baseline knowledge regarding farmer's lung and its prevention and to determine whether a structured planned teaching programme could improve knowledge among farmers in a rural community of Odisha, India.

OBJECTIVES

- I. To assess the baseline knowledge of farmers regarding farmer's lung and its prevention.
- II. To determine the effectiveness of a planned teaching programme on knowledge regarding farmer's lung and its prevention.
- III. To determine the association between baseline knowledge and selected demographic characteristics.

MATERIALS AND METHODS

3.1 Study design and setting

An evaluative research approach using a one-group pretest–post-test pre-experimental design was adopted. The study was conducted in Madhiapali Village, Balangir District, Odisha, India. The village had an approximate population of 2,205 individuals, including approximately 556 farmers.

3.2 Participants and sampling

The study included 100 farmers residing in the selected village. Systematic random sampling was used to select participants, with a reported sampling interval of five.

Inclusion criteria

Participants were eligible if they:

- were farmers aged 18–60 years;
- included both men and women;
- could understand and communicate in Odia; and
- were willing to participate in the study.

Exclusion criteria

Farmers were excluded if they were unwilling to participate or were unavailable during the period of data collection.

3.3 Study instrument

Data were collected using a structured questionnaire consisting of two sections.

Section I: Socio-demographic characteristics

This section collected information regarding age, gender, religion, educational qualification, monthly family income, and source of information regarding farmer's lung.

Section II: Knowledge questionnaire

The 30-item knowledge questionnaire covered four domains:

Knowledge domain	Maximum score
General aspects of farmer's lung	9
Occupational exposure/routes of exposure	3
Signs, symptoms and diagnosis	6
Prevention	12
Total	30

Each correct response received one mark.

Knowledge was categorized as follows:

Knowledge level	Score
Inadequate	0–15
Moderate	16–23
Adequate	24–30

3.4 Development and validation of the instrument

The questionnaire was developed following a review of relevant literature and consultation with experts in community health nursing, medical-surgical nursing, community medicine, and statistics. The tool was reviewed for relevance, adequacy, clarity, and appropriateness.

The reported reliability coefficient was 0.812 using the split-half technique and Karl Pearson correlation coefficient, indicating acceptable internal reliability of the knowledge instrument.

3.5 Planned teaching programme

The planned teaching programme was developed based on a review of relevant literature and consultation with subject experts. The intervention addressed the definition and concept of farmer's lung, occupational risk factors, sources of organic dust and mould exposure, common clinical manifestations, basic diagnostic principles, preventive measures, safe handling and storage of agricultural materials, appropriate respiratory protection, and basic principles of management. The content was presented in simple, culturally appropriate language using practical

examples relevant to farming activities. Charts and flash cards were used as visual teaching aids to reinforce key messages and facilitate participant understanding.

3.6 Pilot study

A pilot study was conducted among 10 farmers in Madhiapali Village from September 15 to September 23, 2024. The pilot participants were not included in the final sample.

The reported mean pretest knowledge score was 11.5, while the mean post-test score was 20.7, with a reported t-value of 9.70. The pilot study indicated that the research procedures and data collection instruments were feasible.

3.7 Data collection procedure

The main data collection was conducted from October 7 to October 27, 2024. Following administrative permission and informed consent, baseline demographic and knowledge data were collected. The planned teaching programme was then administered for approximately one hour. The post-test was conducted on the eighth day using the same knowledge questionnaire.

Participants were informed about the purpose of the study, and confidentiality and anonymity of the information provided were maintained throughout the study.

3.8 Statistical analysis

Data were entered into a master sheet and analysed using descriptive and inferential statistics. Frequencies and percentages were used to describe categorical variables. Mean and standard deviation were used to summarize knowledge scores. A paired t-test was used to compare pretest and post-test knowledge scores. Chi-square tests were used to assess associations between baseline knowledge and selected demographic characteristics. Statistical significance was set at $p < 0.05$.

RESULTS

4.1 Demographic characteristics

The study included 100 farmers. The largest age group was 18–30 years (36.0%), followed by 31–40 years (27.0%), 41–50 years (21.0%), and 51–60 years (16.0%).

Men constituted 62.0% of the participants and women 38.0%. Most participants were Hindu (67.0%). Nearly half (46.0%) had primary education, while 14.0% had no formal education. The most frequently reported monthly income category was ₹4,001–7,000 (48.0%). Mass media was the most commonly reported source of information regarding farmer's lung (60.0%).

Table 1. Demographic characteristics of participants (N = 100)

Characteristic	n	%
Age, years		
18–30	36	36.0
31–40	27	27.0
41–50	21	21.0
51–60	16	16.0
Gender		
Male	62	62.0
Female	38	38.0
Religion		
Hindu	67	67.0
Muslim	24	24.0
Christian	4	4.0
Other	5	5.0
Educational qualification		
No formal education	14	14.0
Primary education	46	46.0
Secondary education	29	29.0
Graduation and above	11	11.0
Monthly income		
₹1,000–4,000	24	24.0
₹4,001–7,000	48	48.0
₹7,001–10,000	18	18.0
≥₹10,001	10	10.0
Source of information		
Health personnel	24	24.0
Mass media	60	60.0
Relatives/friends	5	5.0
Family members	11	11.0

4.2 Baseline knowledge

children belonged to middle-class families (137, 46.9%), while 123 (42.1%) were from poor socioeconomic backgrounds and 32 (11.0%) were from rich families. Most participants were from urban areas (213, 72.9%), compared with 79 (27.1%) from rural areas.

Table 2. Baseline knowledge regarding farmer's lung and its prevention (N = 100)

Knowledge level	Score	n	%
Adequate	24–30	0	0.0
Moderate	16–23	14	14.0
Inadequate	0–15	86	86.0

The mean pretest knowledge score was 11.54 ± 3.97 out of 30, corresponding to 38.4% of the maximum possible score.

4.3 Effectiveness of the planned teaching programme

Following the intervention, the mean knowledge score increased from 11.54 ± 3.97 at pretest to 18.60 ± 5.24 at post-test.

Table 3. Comparison of pretest and post-test knowledge scores (N = 100)

Assessment	Mean	SD	Mean percentage	Mean difference
Pretest	11.54	3.97	38.4	—
Post-test	18.60	5.24	62.0	7.06

The paired t-test demonstrated a statistically significant improvement in knowledge following the planned teaching programme ($t = 20.21$, $p < 0.001$).

4.4 Knowledge categories before and after intervention

The proportion of participants with inadequate knowledge decreased from 86.0% at pretest to 28.0% at post-test. The proportion with moderate knowledge increased from 14.0% to 56.0%, while 16.0% achieved adequate knowledge following the intervention.

Table 4. Distribution of knowledge levels before and after the intervention (N = 100)

Knowledge level	Pretest, n (%)	Post-test, n (%)
Adequate	0 (0.0)	16 (16.0)
Moderate	14 (14.0)	56 (56.0)
Inadequate	86 (86.0)	28 (28.0)

Overall, 72.0% of participants had moderate or adequate knowledge at post-test compared with only 14.0% at baseline.

4.5 Association between baseline knowledge and demographic characteristics

Chi-square analysis demonstrated statistically significant associations between baseline knowledge and educational qualification and monthly income. Age, gender, and religion were not significantly associated with baseline knowledge.

Table 5. Association between baseline knowledge and selected demographic characteristics (N = 100)

Variable	χ^2	df	Interpretation
Age	1.49	2	Not significant
Gender	0.31	1	Not significant
Religion	1.61	2	Not significant
Educational qualification	22.40	3	Significant
Monthly income	9.81	3	Significant

Statistical significance was considered at $p < 0.05$

DISCUSSION

This study identified a substantial baseline knowledge deficit regarding farmer's lung among farmers in rural Odisha. Before the intervention, 86.0% of participants had inadequate knowledge, with a mean score of 11.54/30 (38.4%). This finding is consistent with evidence that farmers experience substantial occupational respiratory exposures, while research specifically addressing respiratory health awareness in farming populations remains limited. (1,2)

The knowledge deficit is important because farmer's lung is associated with repeated exposure to organic antigens, particularly mouldy hay, grain, and other agricultural materials. Current guidelines emphasize detailed occupational and environmental exposure assessment in the evaluation of hypersensitivity pneumonitis. (3,6) Limited awareness of hazardous exposures may therefore contribute to under-recognition of work-related respiratory symptoms and delayed healthcare seeking.

Following the planned teaching programme, mean knowledge increased from 11.54 to 18.60, with a mean gain of 7.06 points. This improvement was statistically significant ($t = 20.21$, $p < 0.001$). The proportion with inadequate knowledge decreased from 86.0% to 28.0%, while 72.0% achieved moderate or adequate knowledge at post-test. Improvements across disease characteristics, occupational exposure, clinical manifestations, diagnosis, and prevention suggest that the intervention enhanced knowledge across the major content domains.

These findings are relevant to occupational health because recognition of hazardous exposures is an important prerequisite for preventive action. Organic dust contains diverse microbial and plant-derived components and is associated with multiple respiratory disorders. (1) Contemporary guidelines also emphasize identification and avoidance of relevant antigens as important components of hypersensitivity pneumonitis management. (3–6,9) Community-based education may therefore provide a practical means of communicating exposure-reduction strategies to farming populations.

Educational attainment was significantly associated with baseline knowledge. Nearly half of participants had only primary education and 14.0% had no formal education, highlighting the importance of accessible health communication. Simple language, visual materials, demonstrations, and locally relevant examples may improve the reach of occupational respiratory health education. Monthly income was also associated with baseline knowledge, indicating that socioeconomic conditions may influence access to health information and the ability to adopt protective practices.

No significant associations were observed between baseline knowledge and age, gender, or religion, suggesting that knowledge gaps were broadly distributed across demographic groups. Community-wide educational approaches may therefore be preferable to interventions targeting only selected demographic categories.

The findings also have implications for community health practice. Nurses and primary healthcare workers can support early recognition of occupational respiratory symptoms, obtain relevant exposure histories, provide education on mouldy agricultural materials and protective practices, and facilitate referral when clinical assessment is required. Such interventions should emphasize feasible measures, including appropriate drying and storage of agricultural materials, ventilation, reduction of dust-generating activities, and suitable respiratory protection.

Importantly, the observed improvement should not be interpreted as evidence that the intervention prevented farmer's lung. The study measured knowledge rather than exposure, behaviour, pulmonary function, disease incidence, or clinical outcomes. Knowledge is an intermediate outcome, and farmers may face occupational and economic constraints that limit their ability to reduce exposure.

The study contributes to the relatively limited evidence on farmer-focused respiratory health education. Although previous research has extensively documented agricultural respiratory exposures and hypersensitivity pneumonitis, fewer studies have evaluated structured educational interventions specifically targeting farmers. (1,2,7) The

present findings suggest that a community-based teaching programme can produce short-term improvements in knowledge and may be a feasible component of rural occupational health promotion.

However, the results should be interpreted in light of the study design. The absence of a control group means that testing effects, external information, maturation, and other temporal factors cannot be excluded. The single-village setting and short eight-day follow-up also limit generalizability and assessment of knowledge retention. Controlled, multicentre studies with longer follow-up and behavioural and clinical outcomes are needed to determine whether improved knowledge translates into sustained exposure-reduction practices and better respiratory health.

5.1 Strengths

This study has several strengths. First, it focused on a rural agricultural population occupationally exposed to organic dust. Second, the educational intervention was specifically designed around farmer's lung and included clinically relevant preventive information. Third, a structured 30-item questionnaire was used to assess knowledge. Fourth, the study examined demographic correlates of baseline knowledge, providing information that may help guide targeted community education.

5.2 Limitations

This study has several limitations. The one-group pretest–post-test design without a control group limits causal inference, as improvements in knowledge may have been influenced by testing effects or other external factors. The study was conducted in a single rural community with 100 participants, which may limit the generalizability of the findings to other farming populations. In addition, the study evaluated knowledge rather than occupational exposure, respiratory symptoms, pulmonary function, preventive practices, or clinical outcomes. The post-test was conducted eight days after the intervention; therefore, the durability of the observed knowledge gain and its translation into sustained preventive behaviour could not be established. Future controlled, multicentre studies with longer follow-up and behavioural and clinical outcome measures are warranted.

IMPLICATIONS FOR PRACTICE

Community-based occupational respiratory health education should be considered within rural health programmes serving agricultural populations. Educational interventions should emphasize recognition of mouldy agricultural materials, safe drying and storage of hay and grain, adequate ventilation, reduction of dust-generating activities, appropriate use of respiratory protective equipment, and early medical consultation for recurrent or work-related respiratory symptoms.

Health workers should also clarify that farmer's lung is not a communicable infection. It is an immune-mediated

response to inhaled occupational antigens occurring in susceptible individuals.

IMPLICATIONS FOR RESEARCH

Future studies should use randomized or controlled designs and recruit participants from multiple agricultural communities. Research should assess not only knowledge but also preventive behaviour, respiratory symptoms, occupational exposure, pulmonary function, and clinical outcomes.

Longer follow-up is required to determine whether educational gains are sustained. Further epidemiological studies in India are also needed to establish the burden of farmer's lung and other agricultural respiratory diseases using standardized occupational exposure histories, clinical assessment, pulmonary function testing, and appropriate diagnostic approaches.

CONCLUSION

This study demonstrated a substantial baseline knowledge deficit regarding farmer's lung and its prevention among farmers in a rural community of Odisha. Following a structured planned teaching programme, the mean knowledge score increased from 11.54 to 18.60 out of 30, representing a statistically significant mean gain of 7.06 points.

The findings support the potential value of community-based occupational respiratory health education for farmers. However, improved knowledge should be regarded as an intermediate outcome rather than evidence of disease prevention. Future controlled studies with larger samples and longer follow-up should determine whether educational interventions produce sustained changes in occupational practices and reduce respiratory morbidity.

DECLARATIONS

Ethics approval and consent to participate

Ethical and administrative permissions were reportedly obtained before data collection. Written informed consent was obtained from all participants, and anonymity and confidentiality were maintained.

Consent for publication

Not applicable.

Availability of data and materials

The data supporting the findings of this study are available from the corresponding author on reasonable request, subject to applicable ethical and institutional restrictions.

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Authors' contributions

The study conception, data collection, intervention, analysis, interpretation, and manuscript preparation were undertaken by the study investigator.

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