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Effectiveness Of A Planned Teaching Programme On Knowledge Regarding Harmful Effects Of Pesticides Among Farmers In Selected Community Areas Of Nagpur, Maharashtra

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ABSTRACT

Background

Agriculture is the backbone of the Indian economy, and pesticides play a significant role in improving crop production. However, improper handling and indiscriminate use of pesticides expose farmers to numerous acute and chronic health hazards. Lack of awareness regarding safe pesticide handling remains one of the major occupational health concerns among farmers. Educational interventions have been shown to improve farmers' knowledge and safety behaviors regarding pesticide use.

Objectives

1. To assess the pre-test knowledge regarding harmful effects of pesticides among farmers.
2. To evaluate the effectiveness of a Planned Teaching Programme (PTP) on knowledge regarding harmful effects of pesticides.
3. To determine the association between post-test knowledge scores and selected demographic variables.

Materials and Methods

A quantitative pre-experimental one-group pre-test and post-test research design was adopted. The study was conducted among 100 farmers selected through purposive sampling from selected community areas of Nagpur, Maharashtra. A structured knowledge questionnaire consisting of 30 items was used for data collection. Following the pre-test, participants received a Planned Teaching Programme on harmful effects of pesticides and safe pesticide handling. A post-test was conducted seven days later. Data were analyzed using descriptive statistics, paired *t*-test, and Chi-square test.

Results

The mean pre-test knowledge score was 12.42 ± 3.61 , whereas the mean post-test knowledge score increased to 24.68 ± 2.84 . The calculated paired t -value was 28.74 ($p < 0.001$), indicating a statistically significant improvement in knowledge following the intervention. Significant associations were observed between post-test knowledge and educational status as well as previous training regarding pesticide use ($p < 0.05$).

Conclusion

The Planned Teaching Programme was highly effective in improving farmers' knowledge regarding harmful effects of pesticides. Regular community-based educational programmes should be integrated into agricultural extension services to promote occupational safety among farmers.

Keywords: Pesticides, Farmers, Planned Teaching Programme, Knowledge, Occupational Health, Community Health Nursing.

INTRODUCTION

Agriculture contributes substantially to India's economy and provides livelihood to millions of families. Chemical pesticides have become indispensable in increasing agricultural productivity by controlling insects, weeds, fungi, and other crop pests. Despite their agricultural benefits, pesticides pose serious health risks when improperly handled or excessively used. Occupational exposure occurs during mixing, spraying, storage, transportation, and disposal of pesticides. Acute exposure may result in nausea, vomiting, headache, dizziness, skin irritation, respiratory distress, and eye irritation, whereas chronic exposure has been associated with neurological disorders, endocrine dysfunction, reproductive problems, kidney disease, liver damage, and certain cancers.

Farmers often neglect the use of personal protective equipment due to inadequate knowledge, financial constraints, discomfort, or lack of awareness. Studies have demonstrated that structured educational interventions significantly improve knowledge and promote safer pesticide handling practices.

In Maharashtra, intensive agricultural practices and frequent pesticide use increase the risk of occupational exposure. Reports from the Vidarbha region have highlighted unsafe storage, improper disposal, limited use of protective equipment, and pesticide-related health problems among farmers, emphasizing the need for awareness programmes.

Considering these issues, the present study was undertaken to assess the effectiveness of a Planned Teaching Programme regarding the harmful effects of pesticides among farmers.

OBJECTIVES

1. To assess pre-test knowledge regarding harmful effects of pesticides.
2. To evaluate the effectiveness of the Planned Teaching Programme.
3. To determine the association between knowledge and selected demographic variables.

HYPOTHESES

H₁: There will be a significant difference between pre-test and post-test knowledge scores regarding harmful effects of pesticides among farmers.

H₂: There will be a significant association between post-test knowledge scores and selected demographic variables.

MATERIALS AND METHODS

A quantitative pre-experimental one-group pre-test and post-test design was adopted. The study was conducted in selected community areas of Nagpur, Maharashtra. One hundred farmers who fulfilled the inclusion criteria were selected using purposive sampling.

The research instrument consisted of two sections:

- Section A: Demographic variables.
- Section B: A structured knowledge questionnaire containing 30 multiple-choice questions on pesticide hazards, routes of exposure, health effects, environmental impact, safe handling, use of personal protective equipment, storage, disposal, and first aid.

The content validity of the tool was established by experts in Community Health Nursing, Medical-Surgical Nursing, Public Health, and Agriculture. Reliability was established using the split-half method, yielding a reliability coefficient of $r = 0.89$.

Following the pre-test, participants attended a 60-minute Planned Teaching Programme delivered through lectures, discussions, charts, demonstrations, and audiovisual aids. The post-test was administered seven days later using the same questionnaire.

Data were analyzed using descriptive statistics, paired t -test, and Chi-square test. Statistical significance was considered at $p < 0.05$.

RESULTS

A total of **100 farmers** from selected community areas of Nagpur, Maharashtra participated in the study. The findings are presented according to the study objectives.

Table 1. Distribution of Farmers According to Age (N = 100)

Age (Years)	Frequency (f)	Percentage (%)
21–30	18	18.0
31–40	32	32.0
41–50	28	28.0
Above 50	22	22.0
Total	100	100.0

Interpretation:

Table 1 shows that the highest proportion of farmers **32 (32%)** belonged to the **31–40 years** age group, followed by **28 (28%)** in the **41–50 years** age group. **Twenty-two (22%)** participants were above 50 years of age, while **18 (18%)** were between 21 and 30 years. The findings indicate that the majority of respondents were middle-aged farmers who are actively engaged in agricultural activities.

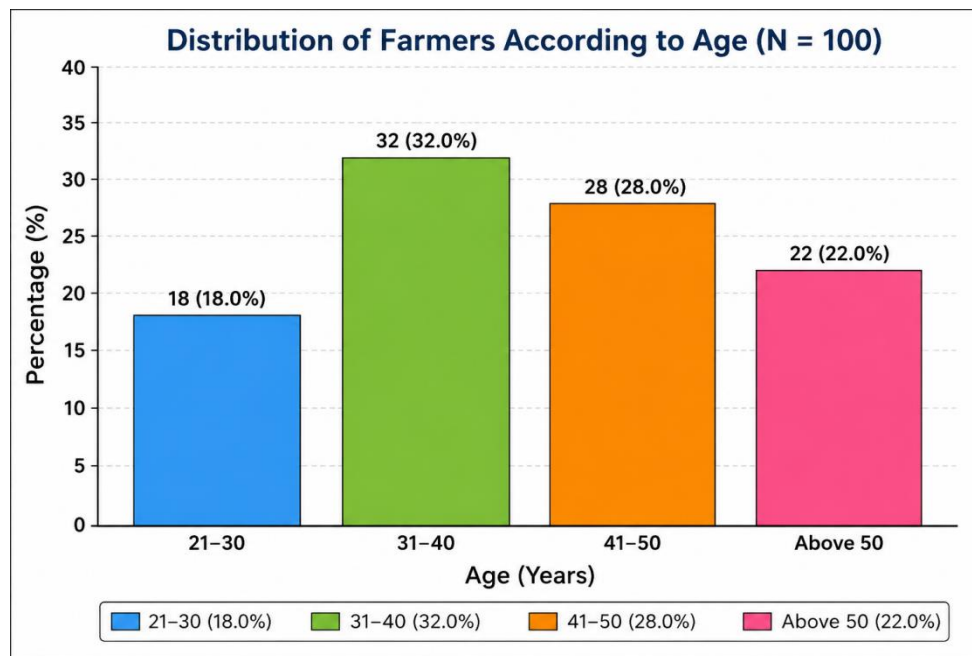


Table 2. Distribution of Farmers According to Educational Status (N = 100)

Educational Status	Frequency (f)	Percentage (%)
Illiterate	24	24.0
Primary Education	30	30.0
Secondary Education	31	31.0
Higher Secondary and Above	15	15.0
Total	100	100.0

Interpretation:

Table 2 reveals that **31 (31%)** farmers had completed secondary education, **30 (30%)** had primary education, **24 (24%)** were illiterate, and only **15 (15%)** had higher secondary education or above. This indicates that most participants had low to moderate educational attainment.

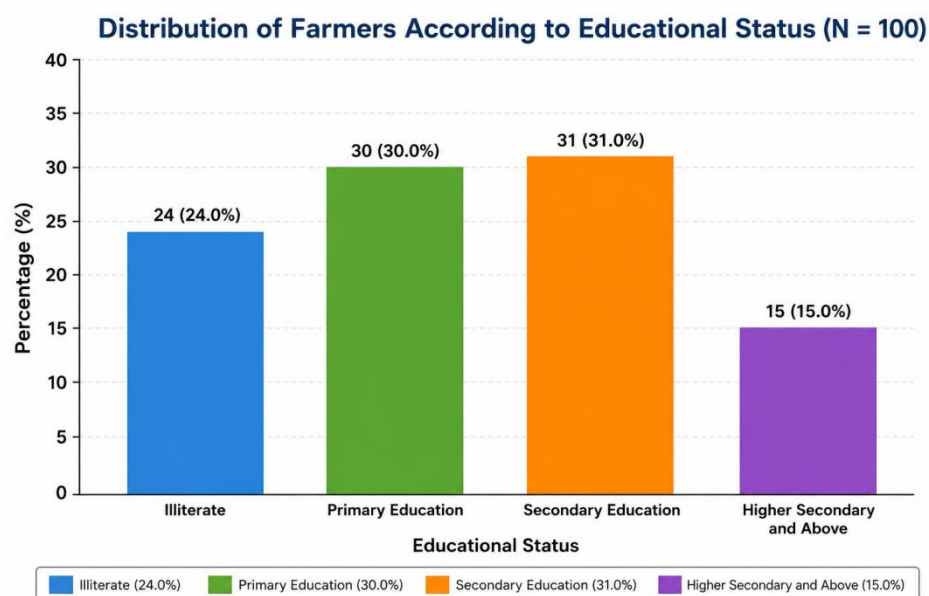
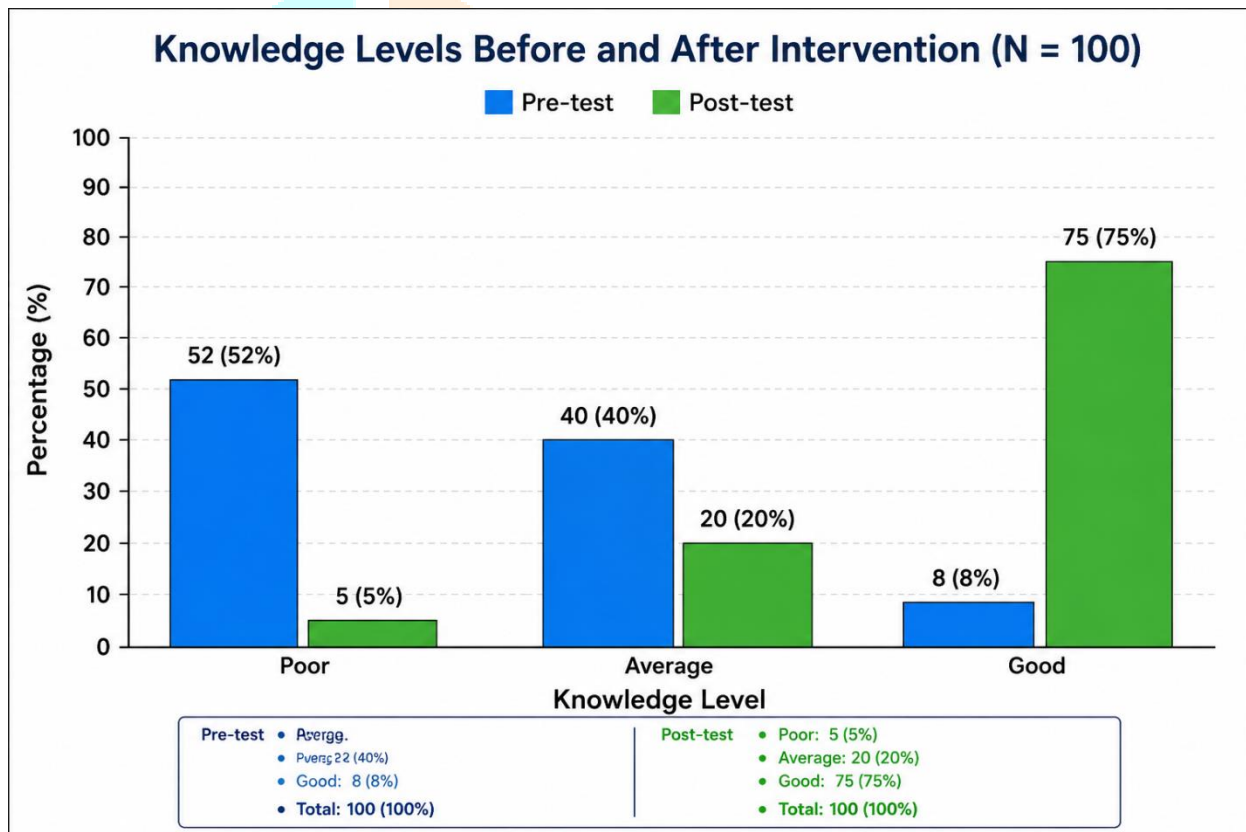


Table 3. Distribution of Farmers According to Knowledge Levels Before and After Planned Teaching Programme (N = 100)

Knowledge Level	Pre-test f (%)	Post-test f (%)
Poor	52 (52%)	5 (5%)
Average	40 (40%)	20 (20%)
Good	8 (8%)	75 (75%)
Total	100 (100%)	100 (100%)

Interpretation:

Before the intervention, the majority of farmers 52 (52%) had poor knowledge regarding the harmful effects of pesticides, while only 8 (8%) demonstrated good knowledge. Following the Planned Teaching Programme, 75 (75%) of the farmers achieved good knowledge, whereas only 5 (5%) remained in the poor knowledge category. These findings demonstrate a substantial improvement in knowledge after the educational intervention.

**Table 4. Comparison of Mean Pre-test and Post-test Knowledge Scores (N = 100)**

Test	Mean	Standard Deviation	Mean Difference	Paired t-value	p-value
Pre-test	12.42	3.61			
Post-test	24.68	2.84	12.26	28.74	<0.001***

***Highly Significant ($p < 0.001$)**

Interpretation:

The mean pre-test knowledge score was 12.42 ± 3.61 , whereas the mean post-test knowledge score increased to 24.68 ± 2.84 . The mean difference between the two scores was **12.26**. The calculated paired **t-value of 28.74** was highly significant at **p < 0.001**, indicating that the Planned Teaching Programme produced a statistically significant improvement in farmers' knowledge regarding the harmful effects of pesticides.

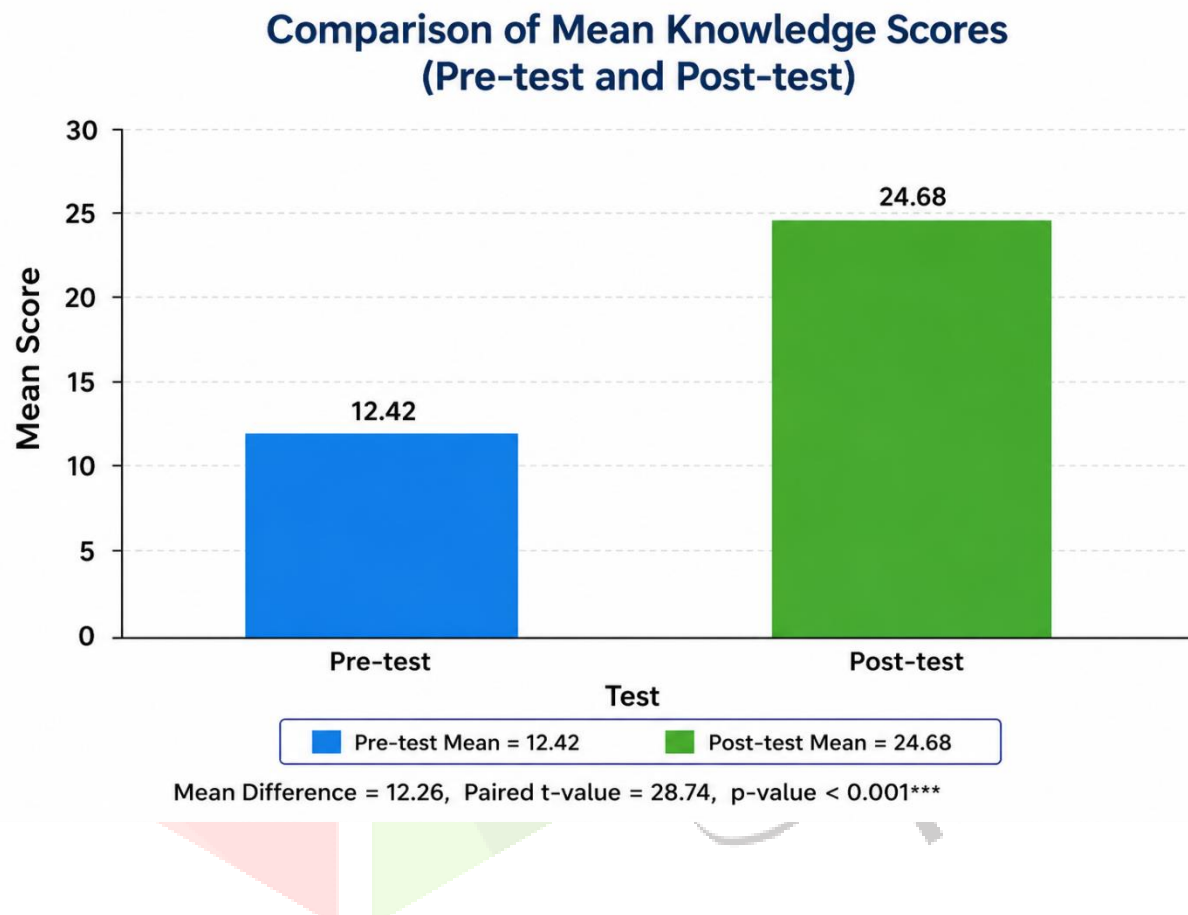


Table 5. Association Between Post-test Knowledge Scores and Selected Demographic Variables (N = 100)

Demographic Variable	χ^2 Value	p-value	Significance
Age	2.84	0.42	Not Significant
Gender	1.38	0.24	Not Significant
Educational Status	12.67	0.01	Significant*
Farming Experience	3.12	0.27	Not Significant
Previous Training on Pesticide Safety	8.41	0.01	Significant*

*Significant at **p < 0.05**

Interpretation:

Table 5 indicates that there was a statistically significant association between post-test knowledge scores and **educational status** ($\chi^2 = 12.67$, $p = 0.01$) as well as **previous training on pesticide safety** ($\chi^2 = 8.41$, $p = 0.01$). However, no significant association was observed between post-test knowledge scores and **age** ($p = 0.42$), **gender** ($p = 0.24$), or **farming experience** ($p = 0.27$).

Summary of Results

- The majority of participants (32%) were aged 31–40 years.
- 31% of farmers had completed secondary education.
- Before the intervention, 52% of farmers had poor knowledge regarding pesticide hazards.
- After the Planned Teaching Programme, 75% of farmers demonstrated good knowledge.
- The mean knowledge score increased significantly from 12.42 ± 3.61 to 24.68 ± 2.84 ($t = 28.74$, $p < 0.001$).
- Educational status and previous pesticide safety training showed significant associations with post-test knowledge, whereas age, gender, and farming experience did not. These findings indicate that the Planned Teaching Programme was effective in improving knowledge regarding the harmful effects of pesticides among farmers.

DISCUSSION

The present study demonstrated a statistically significant improvement in knowledge following the Planned Teaching Programme. The increase in mean knowledge score from 12.42 to 24.68 reflects the effectiveness of structured educational interventions in enhancing awareness regarding pesticide hazards and safe handling practices.

These findings are consistent with recent intervention studies reporting significant improvements in farmers' knowledge, safety behaviors, and use of personal protective equipment after structured educational programmes. Theory-based educational interventions have been shown to increase knowledge related to pesticide side effects and promote safer agricultural practices.

The significant association between educational status and post-test knowledge indicates that literacy influences the effectiveness of health education. Previous training was also associated with higher post-test knowledge, suggesting that repeated educational exposure reinforces safe pesticide practices.

IMPLICATIONS FOR NURSING

- Community Health Nurses should organize regular awareness programmes on pesticide safety.
- Nurses should educate farmers on the use of personal protective equipment.
- Health education regarding first aid for pesticide poisoning should be incorporated into village health programmes.
- Nursing educators should integrate occupational health education into community outreach activities.

LIMITATIONS

- Small sample size (100 farmers).
- One-group pre-test and post-test design without a control group.
- Study confined to selected community areas of Nagpur.
- Assessment limited to knowledge without long-term follow-up of practices.

RECOMMENDATIONS

- Similar studies may be conducted using randomized controlled designs.
- Larger multicentric studies are recommended.
- Long-term follow-up can evaluate sustained knowledge retention and behavioral change.
- Future research should assess both knowledge and actual pesticide safety practices.

CONCLUSION

The Planned Teaching Programme was highly effective in improving farmers' knowledge regarding the harmful effects of pesticides. Community-based educational interventions can substantially enhance awareness of occupational hazards, encourage safer pesticide handling, and contribute to the prevention of pesticide-related illnesses. These findings support the inclusion of structured educational programmes within agricultural extension and primary healthcare services to improve the health and safety of farming communities.

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