



A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE REGARDING AMBIENT AIR POLLUTION (PARTICULATE MATTER) AND IT'S EFFECTS ON HEALTH AMONG PU STUDENTS IN SELECTED PU COLLEGES AT BENGALURU

Ms. Meenakshi V* | Dr. Eswarappa S**

*KNN College of Nursing, Yelahanka Satellite Town, Yelahanka New Town, Bengaluru, Karnataka, India.

**Principal, Sri Sathya Sai University for human Excellence, Department of Nursing, Muddenahalli, Chikkaballapura, Karnataka, India.

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ABSTRACT

Background: Ambient air pollution (particulate matter) is a serious environmental issue: a by-product of increasing urbanization and industrialization. Limited solutions are available to relieve the serious environmental, health and mortality burden associated with ambient air pollution. Thus, further investigation of methods to achieve the management of sources and adverse effects of ambient air pollution on health and environment.

Objectives: (1) To assess the level of knowledge regarding ambient air pollution (particulate matter) and it's effects on health among PU students. (2) To evaluate the effectiveness of a Structured Teaching Programme (STP) in improving knowledge. (3) To find the association between pre-test knowledge and selected demographic variables.

Methods: An evaluative study with pre experimental one group pre-test post-test only design was selected and a convenient sampling technique was used to select 60 PU college students who studying PUC in Seshadripuram PU college and Government PU college, Bengaluru. Pretest was conducted using structured knowledge questionnaire. After the pre-test structured teaching programme was administered and on the 8th day, post-test was conducted by using the same structured knowledge questionnaire.

Results: In the pre-test, 26.67% had poor knowledge, 60% had average knowledge, and 13.33% had good knowledge. After STP, 76.67% gained very good knowledge and 23.33% gained good knowledge. The paired t-test showed significant improvement ($t = 36.463, p \leq 0.05$). Chi-square analysis revealed significant association between pre-test knowledge and age, and previous information regarding air pollution ($p \leq 0.001$).

Conclusion: STP was highly effective in improving PU students' knowledge regarding ambient air pollution and its health effects.

Key Words: Ambient air pollution, particulate matter, PU students, structured teaching programme, Bengaluru.

AUTHOR'S PROFILE:



Author, Ms. Meenakshi V is a nursing academic and researcher affiliated with KNN College of Nursing, Yelahanka Satellite Town, Yelahanka New Town, Bengaluru, Karnataka, India. She has a keen interest in Medical Surgical nursing, adolescent health education, health promotion, and preventive healthcare research. Her research focuses on improving health awareness among students through structured educational strategies, with special emphasis on environmental health issues such as ambient air pollution (particulate matter) and it's impact on human health.



Dr. Eswarappa S. is the Principal at Sri Sathya Sai University for Human Excellence, Department of Nursing, Muddenahalli, Chikkaballapura, Karnataka, India. He has extensive experience in nursing education and academic leadership. His research contributions span multiple areas of healthcare and nursing practice, with publications in reputed journals. He continues to mentor students and promote evidence-based approaches in nursing education and research.



INTRODUCTION

The term “air pollution” signifies the presence in the ambient (surrounding) atmosphere of substances that harmful to human health and environment. In other words, air pollution is a mixture of particles-particulate matter (PM) and gases released into the atmosphere mainly by industries, motor vehicles, and thermoelectric power plants, as well as from biomass and fossil fuel burning. According to the World Health Organization, six major air pollutants include particle pollutants, ground-level ozone, carbon monoxide, sulphur oxides, nitrogen oxides, and lead. Air pollution, both indoors and outdoors, is a major environmental health problem affecting the majority of the population in the world. Ambient particulate matter (PM) air pollution is a heterogeneous mixture of solid and liquid particles of various particle size, shape, chemical composition and source, suspended in the air. It is made up of, primary particles are emitted directly into the atmosphere, and secondary particles are formed through chemical transformations and reactions of PM with gases. It is composed of various substances including nitrates, sulphates, elemental and organic carbon, organic compounds, biological compounds and a variety of metals.

Karnataka State Pollution Control Board (KSPCB) for 2015-16 shows that annual averages of $PM_{2.5}$ were in the range of $50-70\mu g/m^3$ in most parts of the city. The respirable particulate matter is the worry for major cities in Karnataka. Under particulate matter Bangalore has been identified as one among 14 cities that have high levels of particulate matter, while 47% cities monitored in the State exceed ambient air quality standards in this category. The average concentration of SPM (Suspended Particulate Matter) and RSPM (Respirable Suspended Particulate Matter) were 220 & $225\mu g/m^3$ in Bengaluru, which is major worry, these levels were found to be very high in Gulbarga (177 & $68\mu g/m^3$), Hubli (222 & $103\mu g/m^3$), and Dharwad (241 and $115\mu g/m^3$) respectively. Mysore (78 & $41\mu g/m^3$), Mangalore (35 & $72\mu g/m^3$) and Belgaum (70 and $33\mu g/m^3$) found to be the less polluted cities as per the data. The study shows that the status of PM pollution in Bangalore, Gulbarga, Hubli and Dharwad is very severe which shows the bad health of these cities.

Continuous exposure to particulate matter can cause short-term and long-term health issues such as neurological and musculoskeletal diseases, asthma, bronchitis, allergies, cardiovascular diseases, and reduced immunity. PU students are in an important stage of life where they can understand health-related information and develop responsible attitudes toward environmental protection. However, many students have limited knowledge regarding air pollution, its causes, and preventive measures. This highlights the need for effective educational strategies. A Structured Teaching Programme (STP) is an organized method of teaching that uses planned content delivery and audio-visual aids such as charts, handouts, flash cards, and blackboard teaching. It supports better understanding, improves attention, and helps learners retain knowledge. Hence, this study was undertaken to evaluate the effectiveness of STP on knowledge regarding ambient air pollution (particulate matter) and its effects on health among PU students in selected PU colleges at Bengaluru.

MATERIALS AND METHODS

Research Approach and Design

An evaluative research approach was used. The study adopted a pre-experimental one-group pre-test post-test design.

Study Setting

The study was conducted in:

- Seshadripuram PU College, Bengaluru
- Government PU College, Bengaluru

Population

The population included PU students studying in selected PU colleges of Bengaluru.

Sample Size and Sampling Technique

- Sample size: 60 PU students
- Sampling technique: Convenient sampling technique



Study Tool

A structured knowledge questionnaire was used to assess the knowledge of students regarding:

- Meaning and sources of ambient air pollution
- Particulate matter and its types
- Effects of air pollution on health
- Preventive and protective measures

Data Collection Procedure

1. **Pre-test:** The structured knowledge questionnaire was administered to 60 PU students.
2. **Intervention:** Immediately after pre-test, the Structured Teaching Programme was conducted using A.V aids (charts, handouts, flash cards, and blackboard).
3. **Post-test:** On the 8th day, the same questionnaire was administered to assess improvement in knowledge.

Statistical Analysis

Data analysis was done using:

Descriptive statistics: frequency and percentage distribution

Inferential statistics

Paired t-test to determine effectiveness of STP

Chi-square test to find association between pre-test knowledge and demographic variables

Level of significance was set at $p \leq 0.05$ and $p \leq 0.001$ for association.

RESULTS

Table 1: Distribution of PU Students According to Pre-Test Knowledge Level (N=60)

Knowledge Level	Frequency (n)	Percentage (%)
Poor	16	26.67
Average	36	60.00
Good	8	13.33
Very Good	0	0
Total	60	100

Table 2: Distribution of PU Students According to Post-Test Knowledge Level (N=60)

Knowledge Level	Frequency (n)	Percentage (%)
Poor	0	0
Average	0	0
Good	14	23.33
Very Good	46	76.67
Total	60	100

Table 3: Association Between Pre-Test Knowledge and Selected Demographic Variables (Chi-square Test)

Demographic Variable	χ^2 value	Table value	df	Significance
Age	11.724	7.815	3	Significant ($p \leq 0.001$)
Previous information about air pollution	7.894	7.815	3	Significant ($p \leq 0.001$)

DISCUSSION

The present study evaluated the effectiveness of structured teaching programme on knowledge regarding ambient air pollution (particulate matter) and its effects on health among PU students. The findings indicated that prior to STP, most students had average knowledge (60%), while a considerable proportion had poor knowledge (26.67%), showing limited awareness of particulate matter and its harmful effects.

After implementation of STP, the knowledge level improved significantly: 76.67% of students gained very good knowledge, and 23.33% gained good knowledge. This indicates that STP was successful in improving awareness among adolescents.

The paired t-test value ($t = 36.463$) demonstrated a statistically significant improvement in post-test knowledge compared to pre-test, supporting H1. This finding highlights that structured and audiovisual-based teaching is effective for health education among adolescents.



The chi-square test showed significant association between pre-test knowledge and demographic variables such as age and previous information about air pollution. This supports H2, indicating that older students and those who previously received information had better baseline knowledge.

The study findings are consistent with earlier research showing that educational interventions increase knowledge and awareness of environmental health hazards and encourage preventive measures.

CONCLUSION

The study findings concluded that there was 130.25% of mean percentage knowledge in the overall regarding ambient air pollution (Particulate Matter) and its effects on health, after the administration of structured teaching programme. This indicates that, structured teaching programme is an effective teaching strategy in the education system, as it is interesting and easy for the PU students to comprehend. The significant increase in post-test knowledge indicates that STP is a valuable teaching strategy in health education. Regular implementation of such educational programmes in schools and colleges can help adolescents adopt preventive measures and contribute to Environmental awareness and pollution reduction.

RECOMMENDATIONS

1. STP can be implemented regularly in PU colleges and schools as part of health education.
2. Awareness programmes on air pollution should be conducted with demonstrations and visual aids.
3. Similar studies can be conducted with larger sample size and control group design.
4. Follow-up studies can be done to assess long-term retention of knowledge and behavioural changes.

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