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A Study On Awareness of Air Pollution and Health Issues Among Higher Secondary School Students

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Abstract: Air pollution is the presence of one or more contaminants in the atmosphere, such as dust, fumes, gas, mist, odour, smoke or vapour, in quantities and duration that can be injurious to human health. The main pathway of exposure from air pollution is through the respiratory tract. Breathing in these pollutants leads to inflammation, oxidative stress, immunosuppression, and mutagenicity in cells throughout our body, impacting the lungs, heart, brain among other organs and ultimately leading to disease. The major objective of this study was to find out the awareness on air pollution and health issues among higher secondary school students. The investigator developed Awareness Scale on Air Pollution and Health Issues for measuring the awareness on air pollution and health issues among Higher Secondary school students. The sample for the study consisted of 120 Higher Secondary school students in Thiruvananthapuram District, India. The data collected from the students were statistically analysed by using percentage analysis, t-test and ANOVA. The study revealed that majority of higher secondary school students has awareness on air pollution and health issue at low level. The result also showed that there is significant difference in awareness on air pollution and health issue based on type of institution. But there exists no significant difference between rural and urban, boys and girls among higher secondary school students in their awareness on air pollution and health issue.

Keywords: Pollution, Health issues, Contaminants, Air pollution, Pollutants, Awareness scale

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Introduction

Air pollution is a familiar environmental health hazard. It is now considered to be the world's largest environmental health threat, counting for 7 million deaths around the world every year. Air pollution is a blend of harmful substances from both human-made and natural sources. However, some groups of people are especially sensitive to

common air adulterants similar as particulates and ground-level ozone. Sensitive populations include children, grown-ups, people who are active outside, and people with heart or lung diseases, such as asthma. The sources of air pollution include natural sources and human made sources.

Air pollution, particularly in urban areas, constitutes a public health concern, as it has a harmful effect on the health, survival and activities of humans and other living organisms (Pénard and Annesi, 2004). Naturally being particulate matter (PM) includes dust from the earth's face (crustal materials). Ocean swab in littoral areas and natural material, in the form of pollen, spores or factory and beast debris. Other natural sources of air pollution include thunderbolts, which produce significant amounts of oxides of nitrogen (NO_x); algae on the face of the abysses, which give out Hydrogen Sulphide (H₂S); wind corrosion which introduces patches into the atmosphere; and sticky zones, similar as wetlands, peat-bogs or little deep lakes, which produce methane (CH₄). In civic areas, utmost air pollution comes from human-made sources. Similar sources can be classified as buses, exchanges, aeroplanes, marine machines, electronic power shops etc. Vehicle emissions, fuel oils and natural gas to heat homes, by-products of manufacturing and power generation, particularly coal-fueled power plants, and fumes from chemical production are the primary sources of human-made air pollution. Leung (2015) conducted a study on challenges and opportunities in indoor and outdoor air pollution in urban environment. According to him good indoor air quality is critically important to safeguarding our health since we spend most of our time indoors.

Human activities have increased the quantity of volatile organic compounds due to petroleum chemical diligence and transportation, and oxides of nitrogen (NO_x) from combustion in power stations and motorcars. Accordingly, O₃ is more concentrated and more gauze occurs in densely populated and industrial regions. Activities contribute to total ambient particulate matter (PM). Coal and Sulphur from fuel oils oxidise into SO₂. These are fuels that are used to move, warm up and get the necessary energy to the numerous artificial processes also. The industry produces some specific adulterants as waste similar as fluorine derivations or aluminium. Air pollution emissions were released from both natural and

anthropogenic sources. Human-driven activities aimed at providing necessary goods and services to society are responsible for the anthropogenic share of air pollution (Gurjar *et al.*, 2010). In accordance with current estimates by the World Health Organization, exposure to air pollution is therefore a more important threat factor for major non-communicable diseases. Air pollution is the largest contributor to the burden of disease from the environment. . Haines *et al.* (2006) reported that climate change is occurring as a result of the accumulation of greenhouse gases in the atmosphere arising from the combustion of fossil fuels. Heal *et al.* (2012) reviewed the current approaches to source apportionment of ambient particles and the latest evidence for their health effects, and describes the current metrics, policies and legislation for the protection of public health from ambient particles.

The main substances affecting health are: Nitrogen Oxides (NO_x), Sulphur Oxides (SO_x), ozone and particulate matter with the latter – especially particulate matter below 2.5 microns (PM 2.5) – being of greatest concern, as these tiny particles penetrate deep into the lungs, affecting both the respiratory and vascular systems. Both extent and duration of the exposure influence health outcomes.

Noxious pollutants in the air, or deposited on soils or surface waters, can impact wildlife in a number of ways. Like humans, animals can experience health problems if they are exposed to sufficient concentrations of air toxics over time. Studies show that air toxics are contributing to birth defects, reproductive failure, and disease in animals. Researchers, Dhanya and Pankajam (2017) reported that there was no significant environmental awareness among secondary school students of Coimbatore district in Tamil Nadu.

Air pollution is a problem for all of us. Air pollution causes and exacerbates a number of diseases, ranging from asthma to cancer, pulmonary illnesses and heart disease. Outdoor air pollution and particulate matter, one of its major

components, have been classified as carcinogenic to humans by the International Agency for Research on Cancer.

Air pollution and its effect on human health are presently being discussed in both the scientific and political arenas. However, air pollution from natural sources has continuously existed. Air pollutants can lead to health problems either directly when they enter the organism or indirectly by the change of the environment. Pollutants enter the organism through three different mechanisms—(1) Inhalation: man breathes $\sim 15 \text{ m}^3$ of air, including pollutants every day; (2) Ingestion: some air pollutants can deposit onto soil or surface water, where they are taken up by plants and ingested by animals, and are eventually introduced into the food chain; and (3) Skin contact: this type of contact is less frequent, except in case of accidental pollution or armed conflicts.

Air pollutants can cause serious health problems, including respiratory problems like asthma, bronchitis, irritation of the lungs, pneumonia, and decreased resistance to respiratory infections, allergies, adverse neurological, reproductive and developmental effects, cancer, and even early death. Several reviews have reported extensively on the effects on health. The impact of air pollution on human health is growing. Public health concern now includes cancer, cardiovascular disease, respiratory diseases, diabetes mellitus, obesity, and reproductive, neurological, and immune system disorders.

Research on air pollution and health effects revealed that 57,000 women found living near major roadways may have increased risk for breast cancer. Also it was found that other airborne toxic substances, especially methylene chloride, which is used in aerosol products and paint removers, are also associated with increased risk of breast cancer. Occupational exposure to benzene, an industrial chemical and component of gasoline can cause leukemia and is associated with non-Hodgkin's Lymphoma. A long-term study, 2000-

2016, found an association between lung cancer incidence and increased reliance on coal for energy generation. Air pollution can affect lung development and is implicated in the development of emphysema, asthma, and other respiratory diseases, such as chronic obstructive pulmonary disease (COPD). Increases in asthma prevalence and severity are linked to urbanization and outdoor air pollution. Children living in low-income urban areas tend to have more asthma cases than others. People exposed to high enough levels of certain air pollutants may experience irritation of the eyes, nose, and throat; wheezing; coughing; chest tightness; breathing difficulties; worsening of existing lung and heart problems, such as asthma; and increased risk of heart attack.

Healthy, clean and pure environment is a precious gift of nature to the humanity. Like many other organism, man has to depend, for his life on this environment. If we are to aspire to a better quality of life—one which will ensure freedom from want, from diseases and from fear itself, then we must all join hands to root out the increasing toxification of the earth. It is in this context the researcher undertake this study.

The objectives of the study are—(i) To find out the awareness on air pollution and health issues among higher secondary school students; and (ii) to compare the awareness on air pollution and health issues among higher secondary school students in terms of their Gender, Locality and Types of Institution. The hypotheses formulated are – (i) majority of higher secondary school students have awareness on air pollution and health issues; (ii) there exists significant difference between Male and Female higher secondary school students on their awareness on air pollution and health issues; (iii) there exists significant difference between Rural and Urban higher secondary school students on their awareness on air pollution and health issues; and (iv) there exists significant difference between Government, Aided and Management higher secondary school students on their awareness on air pollution and health issues.

Materials and Methods

Method:

The method adopted in the present study is Normative Survey Method. It is the most popular method which attempts to describe and interpret what exists at present in the form of condition, practices, processes, trends, effects, attitudes, beliefs and so on.

Population and Sample for the Study:

The sample for the study consists of 120 students studying in Government and Management Higher Secondary Schools in Thiruvananthapuram District, India .

Tools used:

The investigator developed Awareness Scale on Air Pollution and Health Issues for measuring the awareness among Higher Secondary School students on air pollution and health issues.

Air Pollution and Health Issues Awareness Scale:

The areas include in prepared Awareness Scale are:

- What is air pollution and how does it lead to disease in our bodies?
- What organs are impacted by air pollution?
- What diseases are associated with exposure to air pollution?
- What are some of the most important air pollutants leading to disease?
- How long does someone need to be exposed to air pollution to harm their health?

Based on the above area the investigator prepared 60 items. The draft tool for the pilot study consists of 60 items. After item analysis, the final form of awareness scale consisted of 40 items on three-point scale to measure the level of awareness on air pollution and health issues. The Air Pollution and Health Issues Awareness Scale was administered to a sample of hundred students studying in higher secondary schools. The

reliability of the air pollution and health issues awareness questionnaire was found 0.84. The prepared Awareness Scale was examined by subject experts for validation. This tool was finalized for the final administration to measure the air pollution and health issues awareness of students in higher secondary school. Awareness scale prepared by the investigator measured the level of awareness on air pollution and health issues among higher secondary school students

Procedure:

This study is carried out to explore the awareness of higher secondary school students towards air pollution and health issues. Air pollution and health issues awareness scale for higher secondary school students was prepared to measure the level of awareness on air pollution and health issues. 120 higher secondary school students were selected according to the type of school, locality and gender. Air Pollution and Health Issues Scale was administered as per instructions given in the manual and the responses were scored accordingly. The collected data were subjected to statistical analysis such as percentage analysis, t-test and ANOVA in order to verify the hypotheses.

Statistical Analysis:

The percentage analysis was used to find out the awareness of higher secondary school students towards air pollution and health issues. The Student's t-test and ANOVA was used to analyse the significant difference between the mean scores of the awareness of secondary school students towards air pollution and health issues in terms of gender, locality and types of Institution. The data gathered through the attitude scale was subjected to quantitative analysis i.e., percentage analysis, t-test and ANOVA.

Results and Discussion

1. Analysis of the level of awareness on air pollution and health issues among higher secondary school students:

In this part of the analysis, an attempt was made to study the awareness on air pollution and health issues among higher secondary school students. The level of awareness on air pollution and health issues among higher secondary school students as high, average and low was calculated by applying the formula: $m+sd$, between $m+sd$ and $m-sd$, respectively. The responses of the higher secondary school students regarding the level of awareness on air pollution and health issues and the details is shown in Table 1.

It is seen from the table that 62.5% of higher secondary school students have low level of awareness on air pollution and health issues (Table 1). It is also found that 22.5% of higher secondary school students have average level awareness and 15% have high level awareness on air pollution and health issues.

2. Comparison of the awareness scores on air pollution and health issues among higher secondary school students based on gender:

In order to test whether there is any significant difference between the scores of Male and female higher secondary School students in their awareness on air pollution and health issues, the investigator calculated the critical ratio of awareness scores. The data and the result of the test of significance are given in Table 2.

Table 2 revealed that 't' value obtained for the significant difference among higher secondary school students with respect to their awareness on air pollution and health issues is 0.69 which is lesser than the table value 1.96 at 5% level of significance. Since the obtained 't' is lesser than the table value at 0.05 level, the hypothesis formed in this context, there exists significant difference between male and female higher secondary school students on their awareness on air pollution and health issues is rejected.

Comparison of the awareness scores of male and female higher secondary school students revealed that there is no significant difference between the scores of male and female higher secondary school students ($t=0.69$). Hence, the

hypothesis formed in this context viz. H2 is rejected.

3. Comparison of the awareness scores on air pollution and health issues among higher secondary school students based on locality:

In order to test whether there is any significant difference between the scores of rural and urban higher secondary school students, the investigator calculated the critical ratio of awareness scores. The data and the result of the test of significance are given in Table 3. Table 3 revealed that 't' value obtained for the significant difference among higher secondary school students with respect to their awareness on air pollution and health issues is 1.39 which is lesser than the table value 1.96 at 5% level of significance. Since the obtained 't' is lesser than the table value at 0.05 level, the hypothesis formed in this context, there exists significant difference between rural and urban higher secondary school students on their awareness on air pollution and health issues is rejected.

Comparison of the awareness scores of rural and urban higher secondary school students revealed that there is no significant difference between the scores of rural and urban higher secondary School students ($t=1.39$). Hence, the hypothesis formed in this context viz. H3 is rejected.

4. Comparison of the awareness scores on air pollution and health issues among higher secondary school students based on type of institution:

In order to find out whether the type of institution influence student's awareness on air pollution and health issues, mean and standard deviation of the data were calculated and the ANOVA were computed to see whether there is any significant difference among them. The result and test of significance are shown in Tables 4 and 5. The F-value for the awareness on air pollution and health issues of higher secondary school students on the basis of type of school is 3.12 (greater than 3.07 at 0.05 level of significance). This shows that there is significant difference in the awareness on air pollution and health issues of higher secondary

Table 1: Details regarding the level of awareness of higher secondary school students towards the air pollution and health issues

Level of Awareness	No. of higher secondary School students	Percentage
High	18	15%
Average	27	22.5%
Low	75	62.5%
Total	120	100

Table 2: Result of Test of Significance of Difference between the Mean Awareness scores of Boys and Girls

Gender	No. of higher secondary School students	Mean	Standard deviation	Critical ratio
Female	66	42.83	18.56	0.69
Male	54	40.40	19.65	

Table 3: Result of Test of Significance of Difference between the Mean Awareness scores of Rural and Urban higher secondary school students

Locality of school	No. of higher secondary School students	Mean	Standard deviation	Critical ratio
Rural	65	39.21	16.51	1.39
Urban	55	44.2	21.66	

Table 4: Details of the Test of Analysis of Variance of the awareness on air pollution and health issues of Secondary School students with Respect to their type of school

Variable	Source	Sum of squares	df	Mean square	F	Level of Significance
Type of School	Between groups	2138.278	2	1069.139	3.12	Significant at 0.05 level
	Within groups	40079.72	117	342.5617		

Table 5: Details of Duncan's multiple range test on awareness on air pollution and health issues with Respect to their type of school

Category	N	Subset for alpha =0.05		
		1	2	3
Unaided	47	44.89		
Government	40		34.39	
Aided	33			40.37

school students with respect to their type of school at 0.05 level. But which pair of the group had the significant differences was not specified by ANOVA results. Hence, Post hoc comparisons is used for identifying the specific groups which differ significantly. The details are given in Table 5.

Exploring the difference among the awareness on air pollution and health issues of higher secondary school students, the Duncan test revealed that students in unaided school had higher mean score than that of others. From this it can be inferred that students in unaided school had high awareness on air pollution and health issues when compared to the other two groups. Since the result is in conformity with the hypothesis framed in this context, there is significant difference between Government, Aided and Unaided higher secondary school students on their awareness on air pollution and health issues is accepted.

Conclusion

The study concluded that majority of the higher secondary school students have low level of awareness on air pollution and health issues. The

results clearly indicate that awareness on air pollution and health issues level not differs among the gender and locality. Also, it is revealed that there is significant difference in awareness on air pollution and health issues among students higher secondary level with respect to the type of school. Thus, the study highlighted the importance of imparting awareness among higher secondary school students on air pollution and health issues. By means of teaching the content of air pollution and health issues, the students should be able to transfer the scientific and technical knowledge into daily life. The curriculum designers should also develop their awareness on air pollution and health issues so that they can arrange the materials in a hierarchical order and if so the teaching-learning process will become more effective. This study also highlights the need for incorporating the contents of air pollution and health issues in higher secondary school students curriculum.

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