



## Exploring the Knowledge, Attitude, and Practice of 2nd Year MBBS Students Regarding Pesticides, Food Adulterants, Pollutants, and Insect Repellents in A Tertiary Care Teaching Hospital

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### ABSTRACT

**Introduction:** Pesticides are the chemicals that increase agricultural yield by eliminating, reducing, or repelling pests. Pesticides can enter the body through inhalation, dermal absorption or ingestion with contaminated food. Impacts of air pollution include COPD, cough, shortness of breath, wheezing, asthma, pulmonary insufficiency etc.

**Aim of the Study:** to assess knowledge, attitude, and practice of second year MBBS students regarding pesticides, food adulterants, pollutants, and insect repellents

**Materials and Method:** A questionnaire-based cross-sectional study was conducted among 250 second-year MBBS students. Pre-test was taken before teaching about the topic mentioned above and post-test evaluation was done after teaching about the topic. Both tests were conducted online through google form and the response time given was 20 minutes.

**Result:** The study involved 70 students in pre-test and 156 students in post-test. The majority of the students were male, with a mean age of 19.2 years. In the pre-test, 72.9% of students learned about pesticides from the Internet, research articles, and academic publications. In the post test, 77.4% learned about pesticides via the Internet, research articles, and academic books, and 19.4% from academic books. The pre-test (85.7%) students knew the possible motive for utilising adulterants, and the post-test response increased to 91%.

**Conclusion:** The study concluded that educational efforts or interventions have had a positive impact on increasing awareness and understanding of these topics.

**Keywords:** Pre-test, Post-test, pesticides, response, pollutants, MBBS students.

### INTRODUCTION

Pesticides, are either naturally or chemically synthesized compounds that used to eliminate, reduce, or repel pests, thereby boosting agricultural output.<sup>1</sup> Pesticides play a significant role in increasing yield quantity and quality by protecting crops from weeds, diseases, and pests.<sup>2</sup> These chemical compounds are used in a variety of sectors including food, forestry, agriculture, and aquaculture. They protect people from vectors of infectious disease like malaria, leishmaniasis, typhus, plague, and dengue<sup>3</sup>. Also, they help in controlling weeds, pathogens, insects, and rodents in domestic settings<sup>4</sup>. Unlike other chemical substances, they are designed to impact living systems. When pesticides are stored, mixed, and applied, agricultural workers are exposed to harmful pesticides and their toxicity appears in the living systems. Ingestion, inhalation, and skin or dermal absorption are the three main ways that pesticides can enter a person's body.<sup>5</sup> The two most frequent ways that pesticides are absorbed by farmers are usually through their skin and their lungs.<sup>5</sup> Harmful effects of Pesticides on the health<sup>6</sup> can be immediate or long-term. Immediate effects include allergic reactions, headaches, dizziness, nausea, vomiting, excessive saliva, and sneezing.<sup>7, -10</sup> In the long term, pesticides have been linked to more serious health problems. Some pesticides have been found to have

cancer-causing properties (carcinogenic). Others can disrupt the body's hormone system (endocrine-disrupting).<sup>11</sup> Prolonged exposure to pesticides has been associated with heart problems (cardiovascular disease)<sup>12</sup>, issues with the male reproductive system<sup>13</sup>, damage to the nervous system, high blood pressure (hypertension),<sup>14</sup> kidney failure, and diabetes<sup>15</sup>.

As medical students are future healthcare providers, it is important for them to have a strong understanding of the health risks associated with exposure to occupational and environmental pesticides, food adulterants, pollutants, and insect repellent in order to provide effective care to their patients. They can also play a role in educating the public about these hazards by sharing their knowledge with their patients, families, and friends. Hence, the purpose of this study is to assess the knowledge, attitude and practice of second year MBBS students about occupational and environmental pesticides, food adulterants, pollutants, and insect repellent in a tertiary care teaching hospital.

### Types of Pesticides

**Insecticides:** Includes Carbamates (Carbaryl), Organochlorine (Endosulfan), Organophosphorus (Monocrotophos), Pyrethroids (permethrin),



Neonicotinoids (Imidacloprid), Spinosyns (Spinosad), Benzolureas, Antibiotics (abamectin) etc.

**Fungicides:** Includes aliphatic nitrogen fungicides (dodine), amide fungicides (carpropamid), aromatic fungicides (chlorothalonil), dicarboximide fungicides (famoxadone), dinitrophenol fungicides (dinocap), and others.

**Herbicides:** Include phenoxy acetic herbicides (2, 4-D), quaternary ammonium herbicides (Paraquat), chlorotriazine herbicides (atrazine), sulfonylurea herbicides (chlorimuron), etc.

**Rodenticides:** Inorganic rodenticides (Zinc phosphide, Aluminium Phosphide) or organic coumarin rodenticides (bromadiolone, coumatetralyl).

### Food Adulteration

Food adulteration is intentionally lowering food quality to make more money<sup>16,17</sup>. It's food fraud where people purposely compromise food for profit.<sup>18-20</sup> Food adulteration is possible in several ways. The first method is adding chalk or lead to powdered milk or turmeric. Honey blended with sugar syrup is an example of blending substandard and superior quality. The third is adding unlawful preservatives and colouring dyes, such colouring wine or spices, and the fourth is substituting milk fat with vegetable fat. For artificially ripening fruits and vegetables, Ethylene, ethanol, methanol, propylene, ethylene glycol, and calcium carbide are commonly used.<sup>21-27</sup> Food adulteration renders our common food dangerous and dirty due to mishandling. Adulterated food can cause cancer, diarrhoea, asthma, and ulcers etc.

### Pollutants

Pollutants are harmful solids, liquids, or gases produced in higher-than-usual concentrations that reduce the quality of our environment thereby affecting living organisms. Sources of pollutants includes: **Major sources** (emission of pollutants from power stations, refineries, and petrochemicals, the chemical and fertilizer industries), **Indoor area sources** (domestic cleaning activities, dry cleaners, printing shops, and petrol stations), **Mobile sources** (automobiles, cars, railways, airways, and other types of vehicles), **Natural sources** (physical disasters such as forest fires, volcanic erosion, dust storms, and agricultural burning).

Breathing good quality air daily is important for healthy living<sup>29</sup>. As a result, exposure to polluted air is now recognized as a vital risk factor for noncommunicable human disease conditions<sup>30</sup>. Air pollution has long-term health effects on people<sup>31</sup>

Short-term air pollution exposure is linked to COPD, cough, shortness of breath, wheezing, asthma, respiratory illness, and high hospitalisation rates. Long-term air pollution impacts include chronic asthma, pulmonary insufficiency, cardiovascular illness, and death. Air pollution may also cause respiratory, cardiovascular, mental, and prenatal

issues<sup>32</sup>, leading to infant mortality or chronic disease in adulthood.<sup>33</sup>

Water pollution, which harms humans and the environment, is a global issue.<sup>34</sup> It comes from organic and artificial human activity.<sup>35</sup> Noise pollution from equipment, trucks, traffic, and musical installations damages our hearing. Disability-adjusted life years are mostly caused by air pollution.

### Insect Repellents

In all areas of the world, especially those where vector-borne diseases are endemic, the use of prophylactic insect repellents may not only prevent disease but may also mitigate the severity of allergic reactions to many bites<sup>36,37</sup>. Among 500 species of Anopheles mosquitoes known globally, more than 50 species can transmit malaria from the bite of the infected female Anopheles spp<sup>38</sup>. Most commercial repellents are produced by using chemical components such as N, N-diethyl-metatoluamide (DEET), Allethrin, N, N-diethyl mandelic acid amide, and Dimethyl phthalate etc<sup>39</sup>.

## MATERIALS AND METHOD

A questionnaire-based cross-sectional study was conducted among 250 second-year MBBS students in GSVM Medical College, Kanpur, UP. A pre-test was conducted before taking the lecture about topic and the post-test was conducted after teaching and making the students aware of food adulterants, pesticides, and insect repellents. The pre-test identified the students 'baseline understanding, attitude, and behavior with regard to pesticides used in the workplace and environment, as well as food adulterants, pollutants, and insect repellents. The questionnaires were made available to the students through a Google form link sent to the WhatsApp group. The questionnaire consisted of 14 questions in total divided into three parts of knowledge, attitude, and practice sections. 20 minutes of time was given to submit their responses. We collected all of the responses in the Google sheet and analyzed them accordingly.

## RESULTS

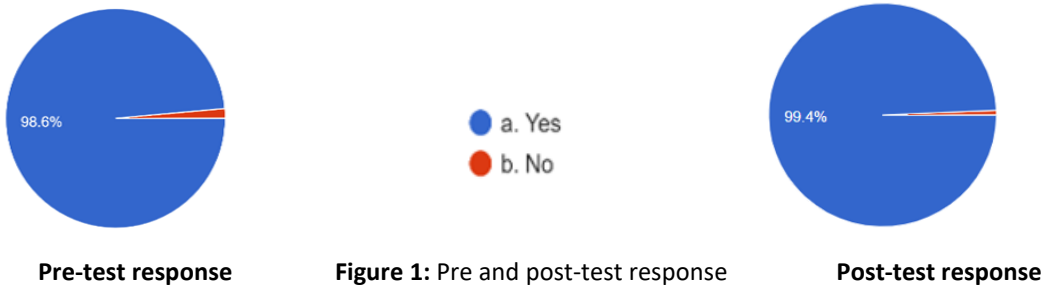
Demographic details of the students are shown in the table below. Out of a total of 250 students, 70 participated in the pre-test and 156 students participated in post-test.

**Table 1:** Demographic details of the participants

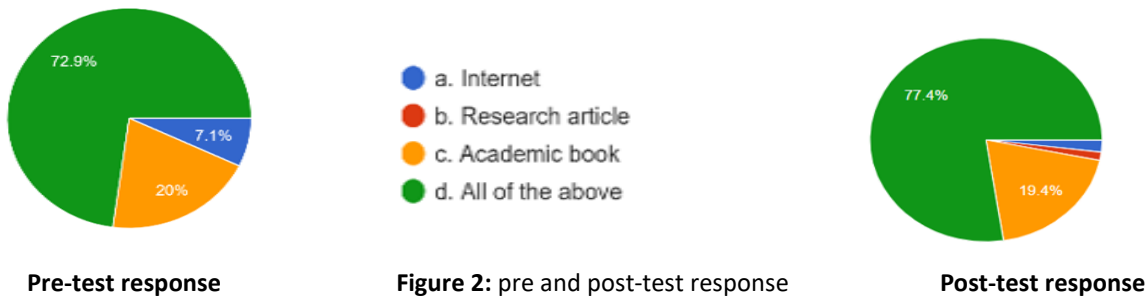
Variable	Characteristics	Pre-test (n=70)	Post-test (n=156)
Gender	Male	56(80%)	86(55.13 %)
	Female	14 (20%)	70 (44.87 %)
Age	19-22years	56(80%)	87 (55.76%)
	22-28 years	14 (20%)	69 (44 .23%)



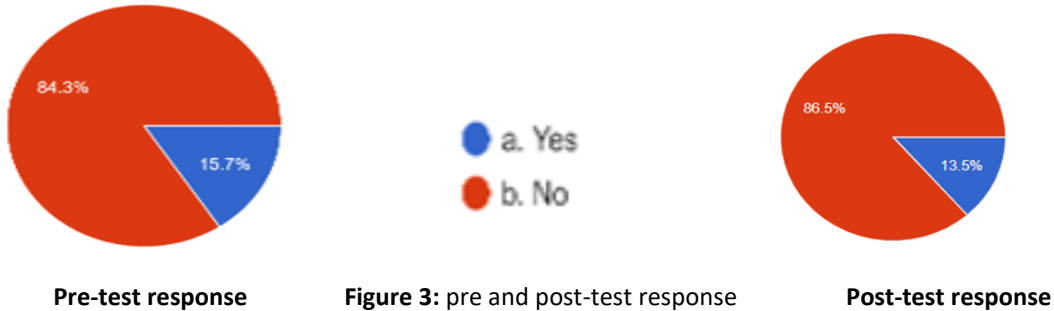
Out of the 250 students, 98.6% in the pre-test, and 99.4% in the post test, were aware of the term pesticides as shown in fig 1 below.



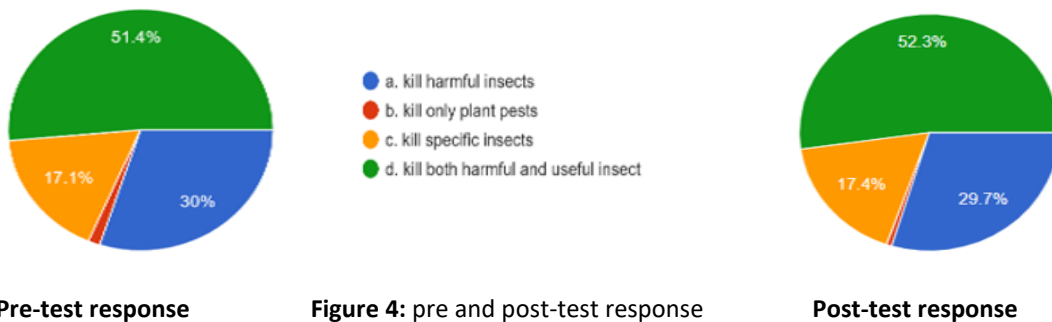
In the pre-test, the majority of students (72.9%) gained knowledge about pesticides from the Internet, Research articles, and Academic books whereas in the post-test. Similarly, in the post test, 77.4% got knowledge about pesticides from the Internet, Research articles, and Academic books and 19.4 % got their knowledge from academic books as shown in fig 2 below.



Both in the pre-test and post-test, a large majority of students (84.3%) knows the fact that food adulterants are not good for health. The post-test showed a slight increase to 86.5% which indicates that most students maintain their negative perception of food adulterants



The pre-test results showed that 51.4% of respondents provided the correct answer regarding the mechanism of action of insecticides. After the post-test, there was a slight improvement, with 52.3% of respondents providing the correct answer as shown in fig 4 below.



In the pre-test, 91.7% and in the post-test 92.9 % of the students responded correctly about the Commonly known environmental pollutants as depicted in the figure 5 below.



## DISCUSSION

This study evaluates a questionnaire on knowledge, attitudes, and practices related to occupational and environmental pesticides, food adulterants, pollutants, and insect repellents. The majority of the participants were male both the pre-test and post-test. In our study, there were 84 female participants. In the pre-questionnaire, it was evident that there were gaps in knowledge, attitudes, and practices related to these areas. Knowledge levels varied, with certain aspects better understood than others. Attitudes were diverse, and best practices.

Sources of information on occupational and environmental pesticides, food adulterants, pollutants, and insect repellents include Internet, books, newspapers, and other sources. Before the lecture, the majority of the students had prior knowledge about environmental pollutants, with 91.7% and 92.9% providing correct responses in the pre-test and post-test.

In our study, 91.3% of the participants correctly identified how pesticides enter the human body in the pre-test, and this percentage increased to 94.2% of the participants providing correct responses in the post-test. Both in pre test and post test, majority of the students are aware of the fact that food adulterants are not good for health. 51.4 % and 52.3% of the students gave correct response that insecticides kill both harmful and useful insects. More than 90% of the students in pre and post test knows the commonly known environmental pollution and only 32.9% in pre test and 40.9% in the post gave correct response about the cause of lathyrism.

The post-questionnaire revealed some positive changes. There was a notable improvement in knowledge, and this was reflected in the increased percentage of correct responses in the post-survey compared to the pre-survey. This suggests that educational efforts or interventions have had a positive impact on increasing awareness and understanding of these topics.

Attitudes showed some positive shifts, indicating that participants were more receptive to adopting safer and more environmentally friendly practices.

## CONCLUSION

It can be concluded well from this study that the majority of the students have prior knowledge about occupational and environmental pesticides, food adulterants, pollutants, and insect repellents, and their attitudes, as well as practice, are positive and agreeable to the questions being asked to them. Our study also serves as a better means to increase the knowledge of the students about occupational and environmental pesticides, food adulterants, pollutants, and insect repellents as evidenced by the comparison of the percentage of correct responses in pre-test and post-test evaluations.

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