



A Cross-Sectional Study On The Knowledge, Attitude, And Practice Of The Eco-Pharmacology Among Undergraduate Medical Students In Tertiary Care Teaching Hospital In South India

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Abstract

Background: The presence of medicinal products in the environment is a globally emerging issue. Ecopharmacology is the science concerned with the entry of chemicals or drugs into the environment through any route and at any concentration disturbing the balance of ecology (ecosystem), as a consequence. Ecopharmacology is also referred to as environmental pharmacology or ecopharmacostewardship.

Aim of the study: To assess the knowledge, attitude, and practices towards Eco-pharmacology among undergraduate medical students in tertiary care teaching hospitals in south India.

Methods: This was a cross-sectional questionnaire-based study. The study was conducted in tertiary care hospital over 2 months between November 2020 to December 2021. The study population was first and third-year 200 MBBS undergraduate students of both gender were included in the study.

Results: Only 39% of the participants were aware of the term Ecopharmacology. 95% of the participants accepted that the drugs are capable of causing water, air, and soil pollution. 93% of participants agreed that expired/unused medicines which are not properly disposed of can pose hazards to public safety. Most of the participants accepted that it is their responsibility to protect the environment from pharmaceutical waste and they expressed their willingness to participate in campaigns for safely raising awareness about drug disposal.

Conclusions: There is poor knowledge of drug disposal behavior. Sufficient training should be given to medical students to protect the ecosystem.

Keywords: Eco-pharmacology, Medical students, Hazards, Environment

Introduction

Eco-pharmacology is a broad term that includes studies of pharmaceuticals and personal care products irrespective of doses and the route of entry into the environment disturbing the balance of ecology.[1] The environmental impacts of pharmaceuticals and personal care products (PPCPs) are largely speculative, these are substances used by individuals for personal health or cosmetic reasons.[2] In recent

years great concern has been expressed over the potential impact of pharmaceuticals on the environment (PIE). Pharmaceutical compounds may enter the environment by different routes such as discharge of treated waste water, seepage from landfill sites, sewer lines, runoff from animal wastes, etc. [3] It is estimated that about 88% of the pharmaceuticals in the environment are a result of patient use. Drug manufacture and the improper disposal of unused medicines also add to the trace

levels of pharmaceuticals in rivers, lakes, soils, and sometimes, drinking water.[4]The trace amount of pharmaceuticals found has ill effects on not only human beings, but also on aquatic life, birds, and terrestrial animals. here are different approaches for the reduction of pharmaceutical pollution in the environment. [5]One such approach is the Environmental Risk Assessments(ERAs). ERAs by definition are predictive assessments of potential risks, normally based on experimental laboratory studies. [6] Assessing the knowledge on the subject of eco-pharmacology is first necessary before creating awareness. Such studies are very few and hence this study was planned to assess the Knowledge, Attitude & Practice (KAP) of eco-pharmacology among undergraduate medical students in Tertiary care Teaching hospitals in South India. Understanding the levels of KAP will enable a more efficient process of creating awareness and seeking a solution. To increase awareness about one of the emerging fields in the medical sciences, eco-pharmacology, and the harmful effects of pharmaceutical abuse on the environment on different levels.

Methods: This was a cross-sectional questionnaire-based study. The study was conducted in tertiary care hospital over 2 months between November 2020 to December 2021. The study population was first and third-year 200 MBBS undergraduate students of both gender were included in the study.

Inclusion And Exclusion Criteria: The first-year and third-year MBBS students of both gender are included. Those who are not willing to participate in the study are excluded.

Design Of Kap Questionnaire: The KAP questionnaire towards Eco-pharmacology was generated from literature and adaptations from previous studies. The questionnaire consists of 10 questions which were divided as follows: Knowledge-based questions 1-3; Attitude-based

questions 4-7 and Practice-based questions 8-10. After obtaining the Ethics Committee approval, the First and Third-year MBBS students were briefed about the purpose of the study, and those who were willing to participate were asked to fill out the questionnaires. Any clarification needed in the understanding of the questionnaire was provided. The KAP survey questionnaire was analyzed question wise and the percentage values were calculated and tabulated.

Results

200 undergraduate MBBS students completed the questionnaire and all the questionnaires were included for evaluation. The response regarding knowledge about “Ecopharmacology” was tabulated in table no.1.Only 39% of the participants were aware of the termEcopharmacology.95% of the participants accepted that the drugs are capable of causing water, air, and soil pollution.93% of participants agreed that expired/unused medicines which are not properly disposed of can pose hazards to public safety. Table 2 shows attitudes toward Ecopharmacology. The attitude of the participants was good. They were bothered about excess medicines at home. Most of the participants agreed that the manufacturers and pharmacies should have drug back schemes. Most of the participants accepted that it is their responsibility to protect the environment from pharmaceutical waste and they expressed their willingness to participate in campaigns for safely raising awareness about drug disposal.

As shown in Table 3, Only 18% of the participants practice purchasing medicines in bulk. 18% of them pour leftover syrup/lotion from the bottle into the washbasin. The majority of them wanted to have a common center for the disposal of unused drugs in government hospitals and they should be collected from there safely.

Table -1-Knowledge about Ecopharmacology

s.no	Questions	Yes (n=200)
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1	Are you aware of the term "Ecopharmacology"?	39%
2	Are drugs capable of causing environmental (water, soil, air) pollution?	95%
3	Can the expired/unused medicines which are not properly disposed of pose hazards to public safety?	93%

Table 2-Attitude of participants towards Ecopharmacology

s.no	Questions	Yes
1	In your opinion are the present methods safe for disposing of medicines? (Methods are –throwing in garbage, giving it to others, and returning it to the pharmacy)	32%
2	Do you think manufacturers and pharmacies should have drug back schemes?	78%
3	Will you participate in activities like a campaign for this issue?	93%
4	Do you feel it's your responsibility to protect the environment from pharmaceutical waste?	85%

Table 3-Practices of participants in Ecopharmacology

s.no	Questions	Yes
1	Do you pour leftover syrup/lotion from the bottle into the washbasin?	18%
2	Do you buy drugs in bulk for family members?	18%
3	Do you remove the drug from its container before Throwing it in the garbage?	22%

Discussion

Ecopharmacology is the science concerned with the entry of chemicals or drugs into the environment through any route and at any concentration disturbing the balance of ecology (ecosystem), as a consequence¹. Environmental Pharmacology is defined as “the effect of pharmaceuticals and house care products on the environment and ecosystem”.² There are guidelines for pharmaceutical waste management (like GMP and FDA guidelines) for the manufacturing units, pharmacists, and consumers.³our study was conducted to assess the knowledge attitude and practice of Ecopharmacology among medical students in a tertiary care hospital. In this study, we observed that few of the participants only(39%) were aware of the term Ecopharmacology. This is higher compared to studies of Shareef et al, Shamim et al and Gupta et al^{4,5,6}but relatively lower compared to AlAzmi et al and Ayele et al study^{7,8}. In our study, 95% of the participants accepted that the drugs are capable of causing water, air, and soil pollution which was higher than Anna Javed et al⁹ study 93% of participants agreed that expired/unused medicines which are not properly disposed of can pose hazards to public safety which is lower than Advani et all study. Compare to Advani et all¹⁰ study, Most(78%) of the participants agreed that the manufacturers and pharmacies should have drug back schemes. 85% of the participants accepted that it is their responsibility to protect the environment from pharmaceutical waste and they expressed their willingness to participate in campaigns for safely raising awareness about drug disposal. In our study, Only 18% of the participants practice purchasing medicines in bulk. This is low compared to Narasimhah et all study in which 56% buy drugs in bulk for a family member. 22% of participants remove the drug from its container before Throwing it in the garbage.18% of them pour leftover syrup/lotion from the bottle into the washbasin which is similar to Manjari et all study and lower than Anna Javed et all study.

Conclusion

Pharmaceutical waste disposal is a highly intricate new barrier in environmental management for healthcare facilities. The knowledge of proper control of pharmaceutical wastes is however deficient among medical professionals. A pragmatic approach should

be there to subsume this relevant issue in the curriculum as the need of the hour. Guidance on this subject should be of utmost relevance in CMEs, conferences, and seminars. The construction of EPV is obligatory to form definite laws and governing practices in developing countries like India. We need to move from assessing the environmental risks of few medicines, towards much more extensive environmental stewardship of pharmaceuticals over their entire life cycles

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