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Editorial

Do we really need multiple terms for a single concept in the field of Environmental Pharmacovigilance?

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Environmental pharmacology is an emerging specialty of pharmacology. It is defined as the effect of pharmaceuticals and house care products on the environment and ecosystem. It involves the study of gene-environment interaction, drug-environment interaction and toxin-environment interaction, for which specific terminologies have been used very appropriately i.e. 'Ecogeneology', 'Ecopharmacology' and 'Ecotoxicology', respectively. [1]

'Ecopharmacology' (Ecosystem + pharmacology) as a broader term describes the entry of both 'pharmaceutics and personal care products (PPCPs)' and 'industrial and chemical pollutants (IACPs)' into the environment by any route and at any concentration disturbing the balance of ecology (ecosystem), as a consequence. This impact of PPCPs and IACPs on environment cannot be a part of Pharmacovigilance activity by virtue of its definition. [2]
Pharmacovigilance is as an activity to monitor, detection, assessment, understanding and prevention of any obnoxious adverse drug reactions at therapeutic dose appear in animal and human beings. The above definition of Pharmacovigilance by WHO is concerned with "therapeutic concentrations". Although, this definition is used in some countries but certainly not in the EU or US where it extends to misuse, abuse, overdose, etc, as well as to environmental effects (regardless of whether the dose was therapeutic or otherwise). The term 'Pharmacoenvironmentology' seeks to deal with the environmental impact of drugs given to humans and animals at therapeutic doses.

With growing technological advances, newer and more effective drugs are being manufactured and used on an ever-growing scale in patients for various medical conditions. When a human or animal is given a drug, it may well or poorly be absorbed from the site of administration. Clearly, unabsorbed drug will pass with faeces into the environment. When humans or animals are given drugs parenterally or orally, the drug may be metabolized to a greater or lesser extent and excreted into the environment (including in exhaled air) as parent drug or metabolites, or as a mixture of both. [2] It means that once they are excreted into the environment (direct affection to the environment), they enter food chains and concentrate into larger predators (indirect affection to the human race).

If the human or veterinary drugs regardless of whether the dose was therapeutic or otherwise enter the environment causing obnoxious reactions subsequent to pharmacotherapy via elimination from living organism, then this concept was defined in a specific domain of Pharmacovigilance or more appropriately a part of environmental Pharmacovigilance[3]. This specific domain was later on referred as PharmacoEnvironmentology in 2006. [3-5] It was specifically dealt with pharmacological agents and their impact on the environment, after elimination from humans and animals as post-therapy.

Ironically, in response to the term, PharmacoEnvironmentology, many new mumbo jumbo words of expressions were later on suggested such as 'EcoPharmacovigilance' in 2007,[6-7] 'PharmEcovigilance' in 2008,[8] 'PharmacoEcomicrobiology' in 2010[9] and 'Ecopharmacostewardship' in 2010.[10] The idea is same, the concept is same and even the subject is same, then why so many terminologies? In addition to this complexity, some authors even mixed-up "PharmacoEnvironmentology" and "EcoPharmacology" as one concept, which further confuses the whole subject!

Some prominent examples of drugs differentiating EcoPharmacology and PharmacoEnvironmentology are given in (Table 1).

Table 1: Examples of Ecopharmacology and Pharmacoenvironmentology

Ecopharmacology	Pharmacoenvironmentology
Pharmaceutical pollution	Estrogens cause feminization of male fish. Ethinyl estradiol adversely affecting fish through its "feminization" of males
Minamata disease in Japan	Antidepressants cause lobsters to be more aggressive
Unwanted drugs are improperly disposed of in the toilet or trash	Humans pass medicines and supplements through their system
Radioactive substances from incinerators	Antidepressant drugs like Fluoxetine (Prozac) triggering spawning in shellfish. Prozac induces reproduction in shellfish
Nuclear, Biological and Chemical (NBC) waste release in international waters	Vultures' death after consuming carcasses of animals treated with Diclofenac sodium
Medicines in drinking water such as pesticides, chlorine, etc.	Traces of Cocaine detected in River Thames even through sewage treatment plants
Common Effluent Treatment Plants (CETPs)	Few drugs are so synthesized that tend to persist in the environment per se even after their excretion e.g. Clofibric acid in the aquatic environment disturbing the local fauna

The table as described above is adapted from the chapter "Pharmacoenvironmentology–Ahead of Pharmacovigilance". In: Rahman SZ, Shahid M & Gupta V Eds. An Introduction to Environmental Pharmacology. Ibn Sina Academy, Aligarh, India, 2008: 35-42

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