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Ecological Impact of Drug Prescription

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Editorial

Ecological thinking goes beyond humans and animals, this approach considers the inextricable links between ecosystems and health. Thus, ecology ranges from molecules to the ecological and sociocultural context, including the relationship between the economy and ecological and social processes. While pharmaceuticals are essential for human and animal well-being, their release into the environment is of growing concern. Emissions of pharmaceutical residues can occur during drug manufacturing, through urine and feces after use in humans or domestic animals, in some cases through use in plants, and through improper disposal of unused drugs [1].

The scenario of excessive medicalization of society in general with the consequent increase in drug consumption gives rise to the fact that drug prescription is one of the largest contributors to the carbon footprint generated by the health system, being of special importance in Primary Care. The production and use of medicines account for between 12% and 25% of greenhouse gas emissions from healthcare, the most important element of the supply chain with respect to carbon footprint [2,3].

In primary care, decisions at the micro level, in the prescription of a drug to individual patients involve systemic changes in a broader system, which we are not always aware of. For example, "micro" decisions of the daily practice of general practitioner, such as the prescription of drugs composed of *Prunus Africana* as treatment -not well founded- of the symptoms of prostatism that leads to the desertification of areas of Africa. Most *Prunus Africana*-based herbals are sold within the European Union. However, as benign prostatic hypertrophy becomes more prevalent in aging American men, and as the theoretical efficacy of the product becomes more widely accepted without scientific basis, the demand for *Prunus Africana* products, in the lucrative American market, is expected to grow as well. So, market demand of the African cherry (*Prunus Africana*) has caused resource depletion and an erosion of traditional resource protection practices. Preservation of the ecology of the area will depend on sustainable harvesting methods and on cultivation [4-7].

Another example is another treatment of phytotherapy for diseases of the prostate, Saw palmetto (*Seronoa repens*), for which it has not been able to demonstrate its usefulness, and it follows a similar line to the problem of *Prunus Africana*. Saw palmetto products are one of the most rapidly growing sectors of the American herbal market. This market is closely tied to present and future sales of *Prunus Africana* products. While Saw palmetto may act to inhibit 5-reductase and as an anti-androgenic and anti-estrogenic, *Prunus Africana* appears to interfere in the associated inflammatory response in the prostate, thus, some herbal formulations contain both products, and there are interrelations between the two markets -Saw palmetto and *Prunus Africana*-, and both products are entirely wild collected. The ecological result of harvest of saw palmetto fruits are more unknown than the effects of the *Prunus Africana* harvest which are known [4-10].

Another important example is contamination of rivers by drugs prescribed by doctors. After taking most of the drugs, the patient will eliminate between 50 and 90% of the pill he/she took through the urine. This waste travels down the drain and goes to wastewater. In the absence of 100% effective purification mechanisms, the waste returns to the waters of the rivers and the sea, where fish, crustaceans and thousands of marine species end up consuming the rest of that medicine

that humans discard. This situation multiplies exponentially in relation to the over-diagnosis and over-treatment that the doctor does. NSAIDs, psychotropic drugs, analgesics, antihypertensives, etc., can be detected in the rivers of major European cities such as Paris, London, Madrid, as well as in the USA [11,12].

All drugs have an impact on the environment: the carbon footprint of production, storage, packaging, transport and waste management, generates more CO2 emissions than the car industry. In recent years it has been repeatedly demonstrated that pharmaceutical products, both in their native form and their transformation products, are present in the environment and that some of them can be toxic to different organisms, as well as accumulate in their tissues. In some cases, the toxicity of the degradation products is even greater than that of the native form of the drug [13,14].

Therefore, as mentioned, human consumption of pharmaceuticals often leads to the environmental release of residues through urine and feces, creating environmental and public health risks. There is a growing body of evidence of effects in wildlife associated with exposure to various drugs, including reproductive disorders, behavioral changes, and disorders of organ development [15-18].

Unnecessary use of antibiotics is particularly concerning from a human health perspective because they can create selection pressure that favors resistant bacterial strains [19,20], which could exacerbate antimicrobial resistance, which poses a major global threat for human health, public health, and economic development [1]. Around 80% of antibiotics prescribed for human consumption are prescribed in primary care and it is estimated that around 50% of antibiotic prescriptions in this setting are unnecessary [21]. The World Health Organization has declared antimicrobial resistance as one of the top ten threats to global health [22]. Additionally, the overuse of antibiotics in agriculture is believed to be one of the main drivers of the increase in bacterial infections in humans that cannot be treated with antibiotics. Although antibiotics may be necessary to treat infections in livestock, they are often used to accelerate animal growth and prevent disease among animals in crowded, unsanitary conditions [23].

Prescribing behavior in the current framework of accelerated medicalization is governed by structural problems of access and limitations in the public health infrastructure that create an environment conducive to the excessive use of drugs. Therefore, from a socioecological perspective, interventions designed to improve knowledge about drugs use or educational interventions aimed solely at individual or interpersonal interactions are unlikely to work, as there is a clear gap between knowledge and practice even with interventions that successfully improve an individual's existing knowledge. Even when awareness of drug overuse is high among human and animal health professionals, this does not translate into better practices or reduced prescriptions. Contextual factors, such as improving infrastructure and regulation, are much more important [24,25].

Nature gives us the example of biodiversity as a survival strategy. Behavior change interventions are very difficult to sustain without addressing structural barriers to accessing care that influence policy and the enabling environment. But, despite that, physicians must be aware of the repercussions in the global ecological system of our (apparently) small or "micro" decisions at the individual level with the patient. In addition, policymakers must consider how responsibilities for managing the risks created by pharmaceutical contamination from human use should be distributed among actors. The pharmaceutical industry must engage strategically to counteract incentives for overprescribing, which are inherently built into their business model.

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