

Effect of Pesticides Exposure on Human Health and Reproductive Life



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Abstract

The current study demonstrates the importance of exposure of man-made extrinsic factors, chemicals, pesticides on the human health, reproductive life, and patterns of conception and context of pregnancy in India. Significantly higher levels of pesticides with endocrine disrupting potential in cases indicate the possible role of these compounds as one of the causes of pregnancy loss in exposed female. Possibly, increased pesticide level appears to indicate increased levels of oxidative damage that has been associated with possible cause of recurrent miscarriage (RM), it may reflect indirect evidence of toxicity rather than direct cause. Further epidemiological studies with larger cross-sectional population need to be performed to clearly elucidate the role of endocrine disruption, polymorphism in metabolic susceptibility genes and genetic environmental interaction in association with reproductive life. This might be helpful in identifying subpopulation/individuals at higher risk.

Introduction

Pregnancy is a complex, heterogenous, biological phenomenon in which the embryo develops into a fetus within the female uterus. The entire process is a vital immunological paradox, where the semiallogeneic fetus survives by evading maternal immune recognition and is delivered after the completion of the gestational period. However, due to various etiological factors, the growing embryo that is unable to survive is expelled from the pregnant mother at different gestational ages and this is referred to as pregnancy loss or abortion. Based on the incidence of sporadic pregnancy loss, the incidence of recurrent pregnancy loss should be approximately 1 in 300 pregnancies. During the last several decades there have been widespread uses of potent substances that, although effective in their intended use, have also been suspected of being harmful to female reproductive health. Prolong exposure of mixture of environmental contaminants that may adversely affect health of human [1]. According to WHO conception loss occurs in 10 to 15% of all gestation cases, out of which 1-2% are recurrent [2,3].

Pesticides Exposure Perspective to Health and Reproductive Life

Multifactorial etiology of recurrent pregnancy loss is among the most studied, yet unresolved issue in modern gynecology [4]. Humans have a great risk of exposure of environmental chemicals or pesticides (organochlorines and organophosphate) through several pathways (ingestion, respiration, skin

contact) used in agricultural settings, public health and individual households [5]. Organochlorine pesticides (OCps) are a structurally heterogeneous class of organic compounds composed primarily of carbon, hydrogen and several chlorine atoms per molecule. It bio-magnify through the food chain and due to slow biodegradation, it accumulate in the body and can remain in the body mainly the adipose tissues, from which it leads in to the bloodstream and finally secreted into breast milk as the main elimination pathway in mammals [6-8].

Organophosphate pesticides (OPPs) are a generic term to include all the insecticides containing phosphorus. They are all derived from phosphoric acid and are generally the most toxic of all pesticides to vertebrate animals [5,9]. Nervous system is the primary target of OPPs [10,11]. The long-term earlier epidemiologic studies revealed its linkage to higher risk of cancer development [5]. The consequences of such exposures on human health are complex and still poorly understood, making risk assessment of any toxic effects of chemical mixtures on human health uneasy [12]. Acute professional exposure to pesticides provided data showing a correlation with several human pathologies, including hepatotoxicity, immunotoxicity, increased risk of mainly hematopoietic, brain and cancers [13-15] neuro-degenerative diseases such as Parkinson's disease [16,17], deficiencies in cerebral development or immunity [18] and reproductive defects [19].

Fundamental Concept of Pesticides Invasion

Pesticide residues are commonly present in food that is grown through intensive industrial farming Sutton [20], food products [21-24], as mixtures or cocktails [25] and individual components [26]. Farmed animals can also accumulate pesticides in the fat and muscles of the animals, some can also be found in the brain, liver, lungs and other offal from contaminated feed and from veterinary pesticide application [27,28]. Household exposure to pesticides is more and more described as a significant risk [29] but the most important source of contamination for the consumer remains food and cocktails of pesticides ingested every day. Moreover, over 25% of fruits, vegetables, and cereals are known to contain detectable residues of at least two pesticides and more than 300 different pesticides are known to contaminate food products [30]. The families of farmers living in agricultural areas may also have a slightly higher than average exposure to pesticides than other people [31]. This is particularly of concern for infants and children because they may be more vulnerable to the toxic effects of some pesticides than adults [32]. When pregnant women and nursing mothers are exposed to pesticides, their children may also be exposed [33,34].

Mechanism of Pesticides Toxicity

Several mechanisms of pesticide toxicity have been proposed, the most important appears to be oxidative stress which are induced by free radicals. Experimental investigations as well as clinical and epidemiological findings have provided evidence supporting the role of reactive oxygen metabolites or free radicals such as singlet oxygen, superoxide anions, hydrogen peroxide and hydroxyl radical in the etiology of recurrent pregnancy loss [35]. The toxicity of chemical raid on human oxidative stress is largely unknown, particularly how mixtures of pesticides by-products affect human toxicity. Restricting analyses to more homogeneous endpoints are important in characterizing human toxicity of pesticides, organophosphate [10,36-39]. The concentrations of a pesticide (chlorpyrifos) in umbilical cord blood were negatively associated with birth weight and length of infants born to low-income minority mothers in New York City before the year 2001 [40]. Another study reported that in utero revelation of organophosphate pesticides associated with adverse birth outcomes and neural development [41]. The yesteryears investigations by earlier workers have suggested that exposure to pesticides at work whilst pregnancy may lead to miscarriage or preterm birth, but the evidence is as yet inconclusive [41-46]. Therefore, the aim of the present literature survey and study to provide and outline for invasion, exposure, and pesticides levels and its effects to induced oxidative stress and their correlation with health, reproductive life and their consequences to sustainability and mankind.

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Conflicts of Interest

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