REPRODUCTIVE AND THYROID HORMONES AMONG
MALE AGRICULTURAL WORKERS EXPOSED TO
PESTICIDES

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Abstract

Background: In rural Egypt, one of the main activities of men is agricultural work, where pesticides are used to control insects and weeds. Pesticides have been classified as endocrine disrupting chemicals, which may lead to alterations in male reproductive and thyroid hormonal levels. Aim: The objective of this study was to evaluate the effect of chronic occupational pesticide exposure on thyroid and male reproductive hormones among agricultural workers. Methods: The study included eighty male agricultural workers from El-Shomoot village, Qalubia governorate. Forty non exposed males work at Banha Faculty of Medicine were selected as a control group. All participating workers were interviewed using a precomposed questionnaire and investigated by measuring the blood level of male reproductive hormones (LH, FSH, testosterone & estradiol) and thyroid hormones (TSH, T₃ & T₄) according to standard procedures. Results: The studied groups were matched as regard age, gender, marital status and smoking habits. In comparing the exposed and control groups according to the blood levels of studied hormones, the exposed group had significantly lower values of testosterone, T₃, T₄, and LH compared to the control group (p<0.05). Moreover, there were higher statistically significant values of TSH, FSH and Estradiol among exposed group compared to control group (p<0.05), such blood levels of studied hormones among exposed group were affected by many factors as type of job, duration of exposure and wearing protective clothes all differences were statistically significant (P<0.005). Conclusion & Recommendations: Chronic exposure to pesticides may cause endocrine disrupting effects on male reproductive and thyroid hormones. So we recommended, improving working condition, restriction of unlimited use of pesticides especially in agricultural purposes. Further researches are needed to evaluate pesticides effect on large sample to obtain detailed information about the exposure routes, pathways, other mechanisms of toxicity and other health hazards.

Key words: pesticides, male reproductive hormones, thyroid hormones, Egypt.
**Introduction:**

Pesticides, including herbicides, insecticides, fungicides, bactericides and rodenticides, are widely used to control pests and pest-induced diseases. (1) Worldwide, approximately five billion pounds of pesticide are consumed annually, (2) among which organophosphate (OP) and carbamate insecticides (34%), dithiocarbamate fungicides (18%) and phenoxy herbicides (12%) are the most commonly used. (3) The toxic properties of pesticides pose a potential hazard to human health. It has been estimated that the incidence rate of pesticide-related illness in the workplaces was approximately 1.17 per 100,000 full time equivalent workers (FTEs) and insecticides were responsible for 49% of all illnesses. (4) Moreover, the incidence rate among agricultural occupations, where pesticides are extensively and intensively used, was much higher (18.2/100,000 FTEs) compared to those employed in non-agricultural occupations (0.53/100,000 FTEs). (5)

The agriculture sector is a very important part of the Egyptian economy. It accounts for 31.6% of total labor force. Total agriculture population is 22.7 million (27.9%) of the total Egyptian population in 2010. (6) In rural Egypt, one of the main activities of men is agricultural work, where pesticides are used to control insects and weeds. Lack of knowledge, carless attitude and appalling practices in handling pesticides pose a serious health risk to our farmers. (7)

The Egyptian environment was injected by 690000 metric tons of pesticides in the last 50 years. All groups of pesticides were used. About 182 compounds were used in Egypt for pest control since 1952. The quantity used from each pesticide varied from place to place and from field to another. By monitoring pesticide residues in in 8 centers, 6 in Qalyoubia governorate (Benha, Kafr Shoukre, El-Khanater, Toukh, Kaluobe & Shebein), and 2 centers in El-Menofia Governorate (Shebien El-Kom and Menof), data indicated that all the tested samples contained pesticide residues. (8)

Globally, pesticide poisoning in the agricultural sector accounts for between 250,000 to 370,000 human deaths annually, most of these deaths occurred in developing countries. (9)
Chronic pesticide exposure is most often a problem in the occupational setting, particularly among poor rural populations where men, women, and children all work and live in close proximity to fields and orchards where chemicals are applied and stored. Long-term exposure to pesticides can increase the risk of developmental and reproductive disorders, immune-system disruption, endocrine disruption, impaired nervous-system function, and development of certain cancers. (10)

Pesticides may interfere with thyroid hormone homeostasis through many mechanisms of action, i.e. at the receptor level, in binding to transport proteins, in cellular uptake mechanisms or in modifying the metabolism of thyroid hormones. (11)

Hormonal balance of male reproductive hormones in particular is an important factor in maintaining fertility and regulating reproductive process. Many pesticides possess hormonal activity and have been classified as endocrine disrupting chemicals. Some pesticides are able to influence the synthesis, storage, release, recognition, or binding of male reproductive hormones, which may lead to alterations in reproductive hormonal levels. (12)

While various efforts have been made to minimize pesticide-related health problems including changing from more toxic chemicals to less toxic ones, and warning labels to communicate risk information to users, increases in the quantity of pesticides continue to fuel concerns about human health problems associated with pesticides. (13)

Few researches have been made to study the morbidity effects of chronic exposure to pesticides in Kaliubia Governorate. (14, 15)