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Dimethoate (Rogor 30 % EC) Induced Histopathological Changes in Thyroid Gland of Female *Rattus Rattus Norvigicus*.

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Abstract: ***There is a considerable effect on biological system and environment due to dimethoate exposure. The purpose of the present study was to investigate the effect of dimethoate (an organophosphate pesticide) on histopathological changes in thyroid gland female rat, for which total twenty animals were divided into 2 groups of 10 each; each group were further divided in to two sub groups for 15 and 30 days. The first group was served as a control administered with daily dose of vehicle olive oil orally by the help of cannula; the second group was exposed with daily dose of dimethoate (rogor 30 % EC) dissolved in olive oil by the help of cannula. The histopathological changes in thyroid gland of '15 days-dimethoate treated group' showed hypertrophied cells and enlarged nuclei, low colloidal epithelial cells and few degenerative changes in epithelial cells. These changes were more prominent in '30 days-treated group' characterized by more damaged follicle joined together and a lot of follicles expanded and contained abundant basophilic cytoplasm as compared to 15 days and control groups. In conclusion, it is established that dimethoate induced architectural changes in female rat and may be a direct effect of dimethoate of dimethoate on acetylecholineestrase.***

Keywords: Dimethoate, olive oil, acetylecholineestrase

1. Introduction

Dimethoate is a group of organophosphate pesticides which is widely used in agriculture and prevention of pest in the field of agriculture It is used against a wide range of insects, including aphids, thrips, plant hopers and white flies on ornamental plants, alfalfa, apples, cotton, grape fruit, grapes, lemons, melons, oranges, pears, pecans, sunflowers, sorghum, soyabean tobacco, tomatoes, watermelons, wheats, and other vegetables It is also used as a residual wall spray in farms buildings for house flies. It has been administered to livestock for control of butter flies. It is available in aerosol spray, dust, emulsifiable concentrate, and ULV concentrate formulation (Hayes and. Laws 1990. and Meister 1992.) Organophosphorus insecticides are generally short-lived and tend not to accumulate in plant or animal tissues to any great extent. They are considered as anticholinestrase insecticides and the mechanism by which they elicit their toxicity is identified and is associated with the inhibition of nervous tissue (Malvisi *et al*., 1992.) and other neurophysiological abnormalities (Peiris *et al*., 2002.). Many studies have been carried on the toxicity of dimethoate on non-target animals and on humans. A study on the toxicological effects of dimethoate (the parameter investigated is serum and erythrocyte cholinesterase activity) in industrial workers in different phases of work formulating dimethoate prsoducts showed no significant difference before and after exposure (Aprea *et al*., 1998.). Results from experiments on the effect of dimethoate on reproductive and endocrine function suggested that it could influence serum concentration of reproductive and metabolic hormones (Rawilings *et al.,* 1998). Administration of dimethoate to pregnant rats produced enzymatic changes associated with mild pathomorphological changes in liver and brain, but no teratogenic effects were observed (Shrivastava *et al.,* 1996). Immunotoxic effects of chronic doses of dimethoate could be detected in three generations of out-breed Wistar rats (Institutions, I and siroki, Desi I 1995). Direct exposure of free living wood mice *Apodemus sylvaticus* to dimethoate demonstrated that it causes a maximum depression of 75% in brain acetylcholinestrase activity compared to non-exposed mice and decreased locomotory activity.

2. Materials and Methods

Dimethoate (rogor 30 % E) 98% was purchased from S M enterprise Zone-2 MP Nagar Bhopal. In the present experimental investigation twenty adult female rats, *Rattus rattus norvigicus* weighing 150±5 g were used for the experiment. The animals were housed in universal galvanized wire cages at room temperature (22 ±2 ºC) and in photoperoid of 12-12 light/dark cycle. The rats were acclimatized for 2 weaks prior to the start of the experiment. Rats were maintained on commercial pellet diet. The animals were divided into two groups. Group I, served as control was fed with standard rats feed and *water ad libitum*. While, group II received a daily dose i.e.1mg/0.5ml/125g/kg b .wt. (dissolved in olive oil) of dimethoate (rogor 30% EC) organophosphate insecticide orally through canula for 15 and 30 days. Animals were sacrificed on days 16th and 31st days after last dose and their thyroid and adrenal glands were dissected out quickly, weighed and fixed (one side thyroid and adrenal) in Bouin's fluid for normal histopathological studies using hematoxylin and eosin staining (Ehrlich, 1886).

3. Result

In histological evaluation of thyroid gland of female rat (*Rattus rattus norvigicus*) control section of thyroid showed normal cellular structure characterized with normal follicles with cuboidal epithelial layer and prominent nuclei, lumens were filled with colloid (Fig.1). The animals exposed with

Dimethoate up to 15 days showed some hypertrophied and degenerative changes in follicles characterized by low epithelial lining with large amount of colloids which suggested hypoactive thyroidal activity (Fig.2). When the duration of dimethoate treatment was extended to 15, and 30 days more sever hypertrophied changes in the follicles with few or amount of colloid in lumens were observed (Fig.3).

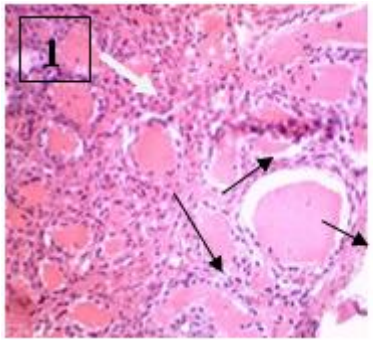

Figure 1: Control thytroid gland

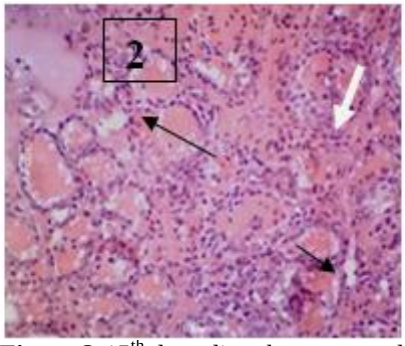

Figure 2:15th days dimethoate treated

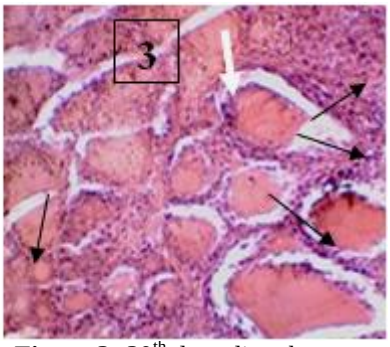

Figure 3: 30th days dimethoate treated

4. Discussion

Thyroglobulin is the glycoprotein precursor of the iodinated thyroid hormones thyroxine (T4) and triiodothyronine (T3). It is synthesized by the follicular cells and stored in the lumen of the follicles (Lin D.J., 2008). It exhibits the general properties of the globulins (Pilling *et al.*, 2007). Hypothyroidism in chlorpyrifos treated rats was reported also by some investigators (Venerosi *et al.*, 2008 and Jeong *et al.*, 2006), who attributed it to degeneration and apoptosis of follicular cells with subsequent decrease in their secretion (Goldner *et al.*, 2010). Degeneration and apoptosis of follicular cells was noticed in chloropyrifos-treated rats as evidenced histologically by shrunken nuclei and vacuolated cytoplasm, ultrastructurally by small heterochromatic nuclei with irregular outlines and degenerated mitochondria and Immunohistochemically by a strong caspase[3] protein expression. (Cohen, 1997). Our histological observation is in agreement with thyroid sections of female rats (Goldner *et al.*, 2010).

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