

Histological study of the hot aqueous extracts of chamomile on renal toxicity Induced by-Methomyl 90%In male albino mice

Ms.c Jenan Mahdi Chani

{ University of Kufa, College of Science, Department of Biology }

Abstract- Methomyl is labeled as a carbamate insecticide. The existent study was projected to research the effect of oral administration of the hot aqueous extract of (Matricaria chamomilla flowers) to (4weeks)on the histopathological alterations of methomex_induced kidney harm in male mice. Methomyl administration caused increment the in grades of creatinine and urea of serum. The histopathological study to kidney appeared the devastation of the normal modality of the renal tissue and significantly existence of several glomeruli showed atrophy with tumescence of bowman's space ,strong stretching of the tissue of cortex tissue and degradation of the epithelium cells which lining the tubules. Pre-administration with Matricaria chamomilla extract as a herbal tea perhaps has preventative influence against methomyl toxic impacts of the kidney.

Key Words- methomyl, chamomile, kidney, toxicity, remediation, mice.

1.INTRODUCTION

Methomyl is (methyl N-[[(methyl amino)carbonyl]oxy] ethanimidothioate) an insecticide of faint chronic but rising severe oral toxicity[1]. these days the chemical fertilizers and pesticides are great using in agriculture to enhance the harvest and quality [2]. Methomyl perhaps facilely bring about ground water pollution in agricultural areas and it was labeled by USEPA (Environmental Protection Agency, USA),WHO (World Health Organization) and EC (European Commission) as a toxic and hazardous pesticide [3]. Methomex (Metho) is labeled via the Environmental Protection Agency (EPA) as restrictive_use pesticide (RUP), or type IB (highly hazardous) [4]. Methomex was derived from carbamic acid and it has been vastly sell since 1967 as a broad-spectrum insecticide to hegemony on the spiders and the ticks [5]. It motivates significant toxicity contra the treated rats [6] by exerting its toxic impact by peroxidative harm to the renal, splenic and hepatic cell membranes. Matricaria chamomilla back to a family Asteraceae. It cultivates in many regions of the world and has a great history of therapeutic influences. Matricaria chamomilla is known of its pharmaceutical properties including : anti-inflammatory[7,8]immune-modulatory activity [9,10] anticancer activity[11],antipruritic action [12],wound healing property [13,14,15] treatment of oral mucositis[16,17].intracanal irrigant[18], therapy of infant botulism [19], treatment of gastrointestinal disorders [20].

2. MATERIALS AND METHODS

2.1 Matricaria chamomilla .

It is family Asteraceae the flowers have been bought from a regional market , Najaf city.

2.2 Preparation of (Matricaria chamomilla hot aqueous extract)

The maceration ways (9)and(10) were used with distilled water to elicit the active ingredients of chamomile. The different concentrations of chamomile were prepared by adding the boiled distilled water to the dry powdered of plant material with diverse concentrations, which have been expressed, in weighted and volumetric concentrations(w/v) . The weight of (5 and 7 g) of the powdered chamomile was separated in individual phial, and then wetted with 100 ml of distilled water and put in a hot locale for (about 30 – 60 minutes) with stable vibration. Then, the extracted has been nominated by nomination process to obtain a pure extracted and free of imperfections. The extracted was kept in a opaque sealed glass inside a refrigerator until we use it .

2.3 Insecticide

The doses have been given orally with distilled water, below their severe LD₅₀ level of poisoning as per the weight of the body. The mouse oral LD₅₀ of methomyl is (10 mg/kg body wt.) [4]. The control mice had received a distilled water for four weeks.

2.4 Experimental design

(24) male mice of Wistar and their weight between (25-30) g and their ages (12-14) weeks were nestled in isolated plastic crates at (Faculty of science / University of Kufa/ Iraq), and they were kept in control environment of (22-25°C). Commercial food (pellets) and spout water were supplied to animals ad libitum, the humidity 50% with (12hrs/12hrs) of light/dark cycle. Mice have been conformed to the environment to a week before starting in the experiment. After acclimation duration, the mice have been weighted. Weighing of mice was done weekly during experimental time to determine the alterations in body weight. Daily feeding consumed was studied by deduction the residual of fodder pellets from the given pellets daily. the weight of the body then calculated. The animals were at random divided into four similar groups (6 mice each). as follows:

Group 1: (negative control group): the Mice have been fed on the main diet and water.

Group 2 : positive (Renal toxicity) control were gave accumulative dose of (5 mg/kg b.wt) of methomyl 90%.

Group 3: have been given composition of the Matricaria chamomilla extract (5 mg/kg b.wt) with the accumulation doses of the methomyl (5 mg/kg b.wt)

Group 4 : given composition of Matricaria chamomilla extract(7 mg/kg b.wt) with the accumulation doses of the methomyl 5 mg/kg b.wt.

Mice weights were registered before the beginning and at the end of the experiment for measure the alterations of the rate of the body weight.

2.5 Statistical Analysis

The analysis of the data has been proceeded by using (statistical Package for Social Science (SPSS) system/ version 17). The results have been elucidated as (mean \pm Standard error). The analysis of variance (ANOVA) used to this purpose [21].

3. RESULT

Kidney histopathology

The histological inspection of the kidney sections of the control group to four weeks methomyl (90%) treated group appeared normal renal corpuscles consist of Bowman capsule and an outer covering layer of simple squamous epithelium tissue. The glomerulus surrounded with Bowman's capsule displayed a normal histoarchitectural modality (Fig.1). The kidneys of mice which were treated with methomyl (90%) for four weeks (Fig 2) appeared glomeruli nephritis, dilation in bowman's space as well as devastation of renal tubules. The inspection of the kidney sections of the methomyl treated group (Fig 3), displayed sloughing of epithelial cells and cellular degeneration. Moreover, methomyl motivated intense necrosis and hemorrhage (Fig 4). The histology of kidney of mice which treated with (5 mg/kg b.wt /day) of mix5 (chamomile and methomyl) to four weeks showed that glomerular nephritis beside Slight improvement in architecture of the renal tissue (Fig5). The section of kidney treated with mix7(methomyl& chamomile) for four weeks show moderate alterations in histological architecture (Fig 6).

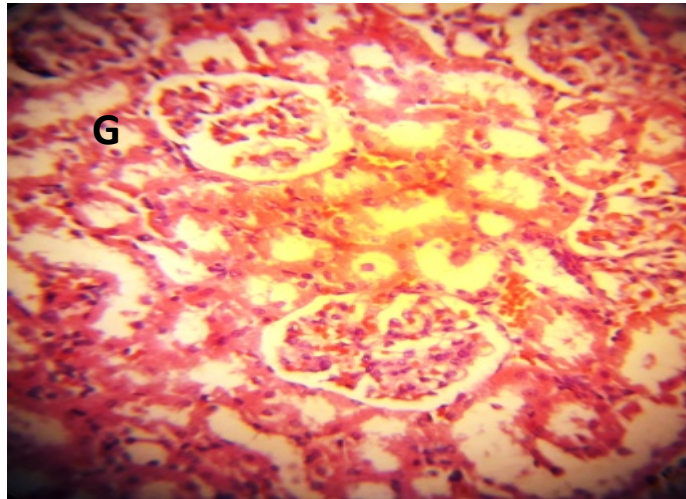


Figure 1: section of Mouse kidney of control group appeared : histological structure of the normal renal corpuscles (G) surround by uriniferous tubules. H & E(200X).

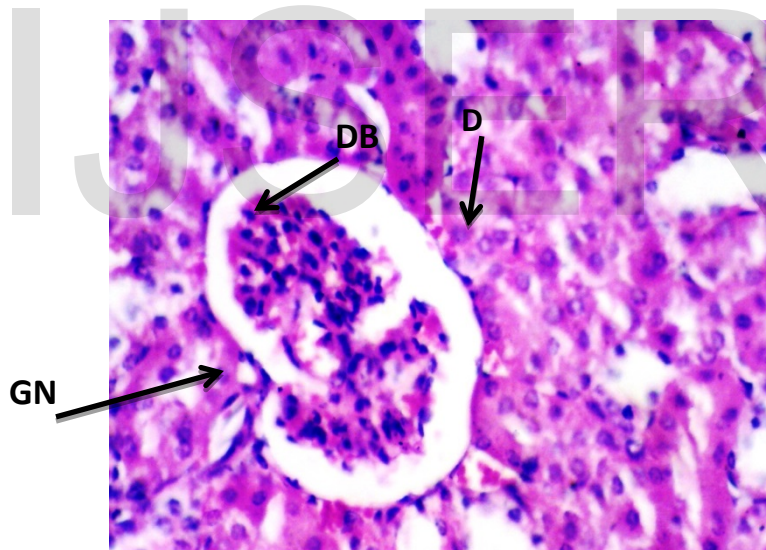


Figure2: Mouse kidney section of methomyl group showing :glomeruli nephritis[GN], devastation of renal tubules[D] and tumescence of Bowman's space. H& E(200X).

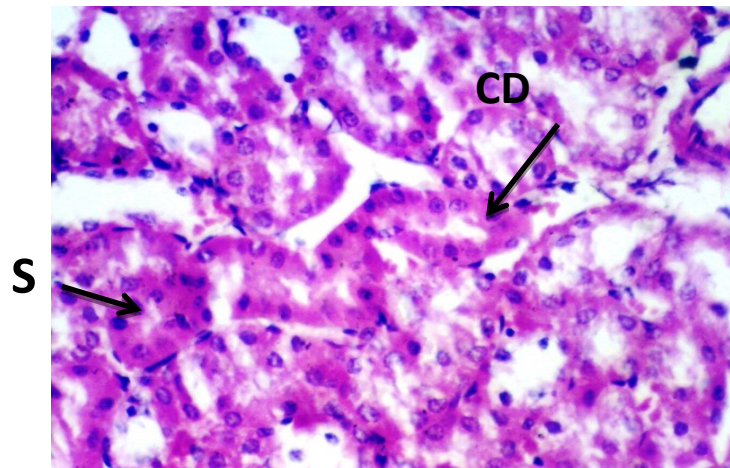


Figure3: Mouse kidney section of methomyl group showing:sloughing of epithelial cells [s].and cellular degeneration (CD).H & E(200X).

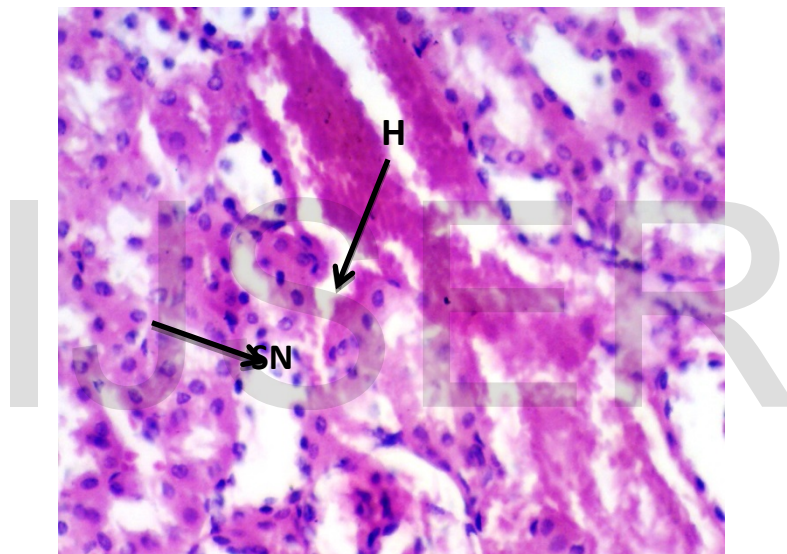


Figure4: Mouse kidney section of methomyl group showing :severe necrosis(SN) and hemorrhage[H] with multivacuolations of the cytoplasm (V) . H &E(200X).

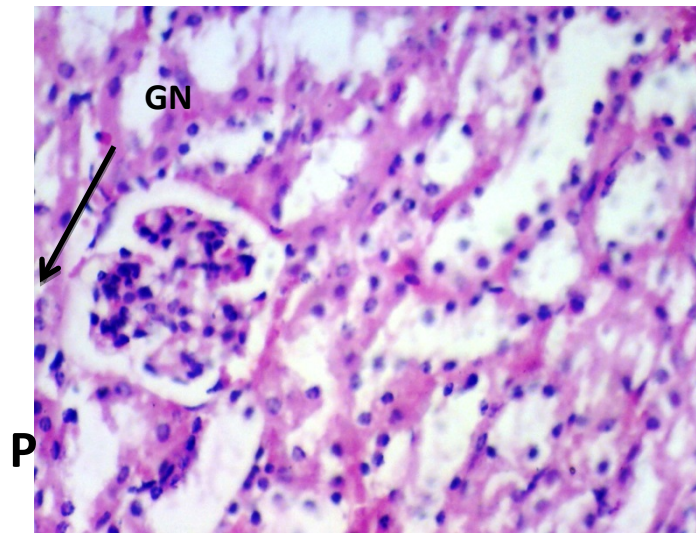


Figure 5: Mouse kidney section of Mix 5 (methomyl&chamomile) 5 gm/kg b.wt.) showing :glomerular nephritis[GN],with pyknosis of their nuclei beside Slight improvement in architecture of the renal tissue H & E (200X).

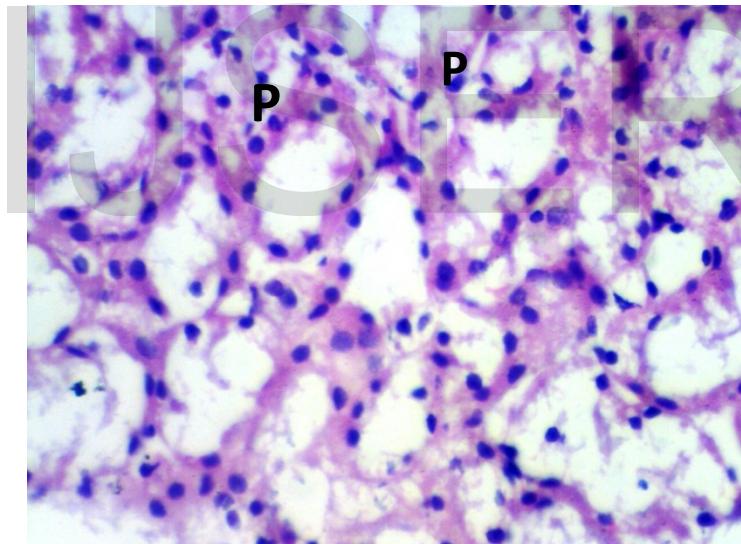


Figure 6: Mouse kidney section of Mix 7(methomyl 5gm &chamomile 7gm) /kg b.wt.) showing: pyknosis of their nuclei and moderate changes in histological architecture of the kidney. H&E (200X).

4. DISCUSSION

In normal histological structure of the kidney, the cortex contains normal architecture of kidneys with prominent Bowman's capsule, a normal tubules and epithelial Cells. Histopathological researches detected some abnormalities in the kidney tissue of animals which were treated with methomyl¹. distension of Bowman's capsule, devastation of renal tubules, Add to the glomeruli nephritis was noticed in the kidney of mice which treated with methomyl four weeks of treatment (figure 2& 3). This result is agreed with [22]Who declared that the exposition of mice to methomyl (5 mg/kg) significantly affected on glomeruli tubules. Similarly, [23,24] observed that glomerular endothelial cells and tubular declination This finding agreed with [25]. Also, [26] was suggested that carbamate insecticide, has adverse influences on kidney functions due to histologic impairment. to the lipoperoxidative harm resulted by methomyl in kidneys of treated mice and the resultant piling up of free radicals. The current research was observed that the degeneration alterations perhaps back to the lipopero oxidative harm due to methomyl. This histological disturbances in the tissue of the renal in a current study is conformity with the results got by [26]. In some cases, [27,28] showed that methomyl caused intense necrosis and hemorrhage as a result of methomyl administration (figure 4). Pre-administration of Matricaria chamomilla with methomyl showed that chamomile has preventive effect in preservation the architecture of the renal tissue (figure 5& 6). The present study was found that Matricaria chamomilla flowers hot Aqueous extract is considered safely plants to animals its administration cause lowering the damage of renal toxicity via amelioration of kidney and liver functions this findings agreed with [29] which was reported that Matricaria chamomilla can eliminate the toxicity and prevent decreasing pathologic alterations and normal architecture in the kidney. In addition to [30] has reported that the main secondary compounds of Matricaria chamomilla are three various chemical class: sesquiterpenes, flavonoids and coumarins, Matricaria chamomilla so has rising grades of polyphenolic components as ascoumarins, herniarin, the main flavonoids compounds are apigenin, luteolin and quercetin which its comprise 16.8, 1.9 and (9.9%) respectively of all flavonoids [30]. so the Matricaria chamomilla is one of the richest origins of the dietary antioxidants which can clear their renal harm renal toxicity.

5. CONCLUSION

It could be concluded that feeding orally of M. chamomile hot aqueous extract to methomyl 90% insecticide -intoxicated mice for (4 weeks) promise protection for renalocytes and has an antioxidant effects and also induce degenerative changes seen in kidney tissues. The present study recommends that intake of Matricaria chamomile flowers is useful for kidney disorders.

REFERENCES

- [1] Kaplan A.M. and H. Sherman. (1977) Toxicol. Appl. Pharmacol. 40(1): 1-17.
- [2] Gambacorta G., Faccia M, Lamacchia C, DiLuccia A, and LaNotte E. (2005) Pesticide residues in tomato grown in open field. Food Control, 16: 629-32.
- [3] Yang G.P, Zhao Y.H, Lu X.L. and Gao X.C. (2005) Adsorption of methomyl on marine sediments. Colloids surf A physicochem Eng Aspects, 264: 179-86.
- [4] Farré M., Fernandez J., Paez M., Granada L., Barba L., Gutierrez H.M. Pulgarin C and D Barceló (2002). Analysis and toxicity of methomyl and ametryn after bio degradation. Anal. Bioanal. Chem. 373: 704-709.
- [5] WHO (1996). Environmental health criteria; Methomyl insecticide. World Health Organization, Geneva, pp. 1-96. <http://www.inchem.org/documents/ehc/ehc/ehc178.htm> (12 November 2008 date last accessed).

- [6] El-Fakharany I.I, Massoud A.H., Derbalah A.S. and M.S. SaadAllah (2011). Toxicological effects of methomyl and remediation technologies of its residues in an aquatic system. J. Environ. Chem. Ecotoxicol. 3(13): 332-339.
- [7] Shipochliev, T., A. Dimitrov and E. Aleksandrova (1981). Anti-inflammatory action of a group of plant extracts. Vet. Med. Nauki., 18(6): 87-94.
- [8] Al-Hindawi M.K., Al-Deen I.H. , Nabi M.H. and M.A. Ismail (1989). Anti-inflammatory activity of some Iraqi plants using intact rats. J. Ethnopharmacol., 26(2): 163-168.
- [9] Uteshev B.S., Laskova I.L. and V.A. Afanasev.(1999). The immune modulating activity of the heteropolysaccharides from German chamomile (*Matricaria chamomilla*) during air and immersion cooling. Eksp. Klin. Farmakol., 62(6): 52-5.
- [10] Macchioni F., Perrucci S. , Cecchi F., Cioni P.L. , Morelli I. and S. Pampiglione.(2004) . Acaricidal activity of aqueous extracts of camomile flowers, *Matricaria chamomilla*, against the mite *psoroptescuniculi*. Med. Vet. Entomol., 18(2): 205-207.
- [11] Srivastava, J.K. and S. Gupta.(2007). Anti proliferative and apoptotic effects of chamomile extract in various human cancer cells. J. Agric. Food Chem., 55(23): 9470-8.
- [12] Kobayashi Y., Takahashi R. and F. Ogino.(2005). Antipruritic effect of the single oral administration of German chamomile flower extract and its combined effect with anti allergic agents in ddY mice. J. Ethnopharmacol., 101(1-3): 308-312.
- [13] Nayak, B.S., Raju S.S. and A.V. Rao.(2007). Wound healing activity of *Matricaria recutita* L. extract. J. Wound Care, 16(7): 298-302.
- [14] Jarrahi, M., Vafaei A.A., Taherian A.A., Miladi H. and P.A. Rashidi.(2008). Evaluation of topical *Matricaria chamomilla* extracts activity on linear incisional wound healing in albino rats Nat. Prod. Res., 22(14): 1197-202.
- [15] Barnes J., Anderson L. ,Phillipson D.(2002). Herbal Medicines 2nd Ed. London: Pharmaceutical Press.
- [16] Martins, M.D., Marques M.M., Bussadori S.K., Martins M.A., Pavesi V.C., Mesquita-Ferrari R.A. and K.P. Fernandes.(2009). Comparative analysis between *chamomilla recutita* and corticosteroids on wound healing: An in vitro and in vivo study. Phytother. Res., 23(2): 274-278.
- [17] Mazokopakis E.E., Vrentzos G.E., Papadakis J.A., Babalis D.E. and E.S. Ganotakis.(2005). Wild chamomile (*Matricaria recutita* L.) mouth washes in methotrexate-induced oral mucositis. Phytomedicine, 12(1-2): 25-27.
- [18] Sadr, L.M.S., Kateb H.R.R, Heady R. and D. Yazdani.(2006). The effect of German chamomile (*matricaria recutita* L.) extract and tea tree (*melaleuca alternifolia* L.) oil used as irrigants on removal of smear layer: A scanning electron microscopy study. Int. Endod. J., 39(3): 190-195.
- [19] Bianco, M.I., Lúquez C., De Jong L.I. and R.A. Fernández.(2008). Presence of clostridium botulinum spores in *Matricaria chamomilla* botulism. chamomile) and its relationship with infant Int. J. Food Microbio., 121(3): 357-360.
- [20] Mahady, G.B., Pendland S.L., Stoia A., Hamill F.A., Fabricant D., Dietz B.M. and L.R. Chadwick.(2005). In vitro susceptibility of *Helicobacter pylori* to botanical extracts used traditionally for the treatment of gastrointestinal disorders. Phytother. Res., 19(11): 988-991.
- [21] AL-Rawi K M.(2000). Introduction to Statistics. 2nd.ed , College of Agriculture and Forestry, Mosul University.
- [22] Radad K, Hashim A, EL-Sharqawy EEG, Youssef MSE (2009). Histo-pathological effects of methomyl on sprague-dawley rats after repeated application. Bulg. J. Vet. Med. 12(2): 149-157.

- [23] Nariman A.R., Ahmed A.R., Amira H.M., Dessouky M.I. (1995). Serum bio-chemical and histopathological changes associated with repeated exposure of rats to Thiodicarb insecticide. *Egypt.J. Comp. Pathol. Clin.Pathol.* 8: 79-85.
- [24] Selmanoglu G., Barlas N., Songür S., Koçkaya E.A. (2001). Carbendazim-induced haematological, biochemical and histopathological changes to the liver and kidney of male rats. *Hum. Exp. Toxicol.* 20: 625-630.
- [25] Manna S., Bhattacharyya D., Basak K., Mandal T.K.(2004) Single oral dose toxicity study of alfa-cypermethrin in rats. *Indian Journal of Pharmacology*,36:25-8.
- [26] Ksheerasagar R.L., Kaliwal B.B.(2006) Histological and biochemical changes in the liver of albino mice on exposure to insecticide, carbosulfan. *Caspian Journal of Environmental Sciences* ,4:67-70.
- [27] El-Khawaga OA (2005). Role of selenium on antioxidant capacity in methomyl-treated mice. *J. Physiol. Biochem.* 61(4): 501-506.
- [28] Mansour SA, Mossa AH, Heikal TM.(2009) Effects of methomyl on lipid peroxidation and antioxidant enzymes in rat erythrocytes: in vitro studies. *Toxicology and Industrial Health* , 25:557-63.
- [29] Al-Musa H and AL-Hashem F.(2014). Hypoglycemic, hepato-renal and antioxidant potential effects of chamomile recutia flowers ethanolic extract in streptozotocin-diabetic rats. *american Journal of Pharmacology and Toxicology* 9 (1): 1-12.
- [30] Emam, M.A.(2012). Comparative evaluation of anti diabetic activity of *Rosmarinus officinalis* L. and *Chamomile recutita* in streptozotocin induced diabetic rats. *Agric. Biol. J.N. Am.*, 3 : 247-252.

IJSER