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Toxic Effects of Acrolyc Denture Teeth Resin, Lucitone 119 on Animal Model: Rats Wistar

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Abstract: This study examines the potential toxic effects of lead compounds of an acrylic resin used in the manufacture of dental bases: the LUCITONE 119. The resin treatment is swallowed by diluting the compound in the drinking water of female Wistar rats. After treatment for 07 days and 21 days, average weights of animals and two organs (liver and spleen) are determined. Meanwhile, cellular blood components (red cells, hemoglobin, hematocrit, platelets, lymphocytes, monocytes and granulocytes) and haematological parameters (MCV, MCH and MCHC) were measured. The results show a disturbance in average weight of rats associated with that of the two organs involved (liver and spleen). Biochemical assays show a significant hematotoxicity mainly on platelets, hematocrit and leukocyte lineage.

Key words: Acrylic resin · Lucitone119 · Wistar Rats · Hematological toxicity · Blood

INTRODUCTION

Acrylic resins come largely in the manufacture of dental bases. However, some components of these resins are genuine agents that cause irritation, inflammation and other allergies of the oral mucosa [1]. Many clinical studies underscore the toxic effects of resin components on the tissue [2, 3], animals [4, 5] and cell cultures [6, 7]. The lucitone199 is a resin mainly containing methyl methacrylate, this compound polymerizes readily at room temperature, when not properly stabilized. Heat, light and contact with the initiators such as oxidants (peroxides, nitrates, strong acids and bases or iron oxide even at trace levels) causes rapid polymerization of methyl methacrylate (MMA monomers C_5 H_8 O_2, highly reactive), [8, 9], the class of methyl methacrylate monomer as not carcinogenic in human and animal studies point to the lack of carcinogenic effect. All these observations have allowed us to build our problem, it is to develop and analyze many aspects of poisoning with resin Lucitone199 female Wistar rats. The current study on the one hand, the effects of LUCITONE 119 on changes in body weight of animals and their organs and secondly, assessing the effects of the resin in question on some blood parameters in female rats Wistar.

MATERIALS AND METHODS

Treatment Protocol Rats by Lucitone 119: The rats used in our work are female white rats of Wistar strain aged 06 months; they weigh between 150 and 200G and from the Pasteur Institute of Algiers.

Preparation of Discs: The preparation of the disks is made using traditional methods (heat). The mixture (powder and liquid) previously prepared heated. The powder consists essentially of poly-methyl methacrylate mixed with a benzoyl peroxide which acts as a donor of free radicals. The liquid is composed of methyl methacrylate monomer, [10].

Hematology

Quantitative Analysis (Form Blood Count: FBC): The fraction of blood collected in EDTA tubes allows for the counting of some hematological parameters using the Coulter S plus, it's red blood cells (RBC), WBC (UK), hematocrit (HT) hemoglobin (HB), platelets (thrombocytopenia), mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC) and mean corpuscular hemoglobin (MCH).

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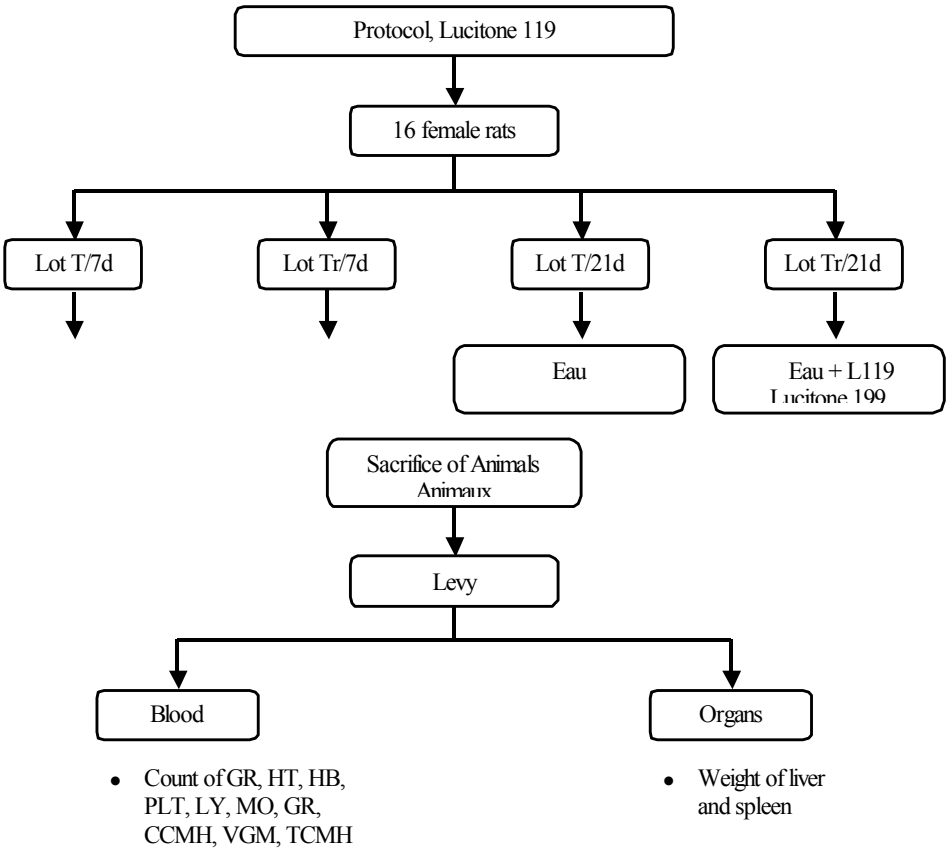

Fig. 1: Diagram of the treatment of Wistar rats with 119 LUCITONE

RESULTS

Effect of Treatment with LUCITONE 119 on the Average Weight of Wistar Rats: Variations in the average weight of Wistar rats after treatment with LUCITONE 119 are shown in Figure 02.

This figure shows that the average weights of control rats at 07 and 21 days are almost the same. There is, however, that treatment with the resin 119 LUCITONE 07 days tends to reduce the average weight of rats treated by almost 10%. After 21 days of treatment, the weight loss becomes more important and reaches approximately double that recorded at 07 days (20%).

Effect of treatment with LUCITONE 119 on the average weight of the liver: Variations in the average weight of the liver of Wistar rats after treatment with LUCITONE 119 are shown in Figure 03.

Changes in average weight of the liver of Wistar rats treated with 119 LUCITONE show that no change is observed in the organs of control rats. Meanwhile, in rats treated fairly sharp reduction of 15% is obtained, it is much higher (30%) after 21 days of treatment with LUCITONE 119.

Effect of treatment with LUCITONE 119 on the average weight of the spleen: Variations in the average weight of the spleen of Wistar rats after treatment with LUCITONE 119 are shown in Figure 04.

It can be seen from this figure that treatment with LUCITONE 119 after 07 days has no effect on the average weight of the spleen. After 21 days of treatment with the resin, a slight increase in the average weight of spleen was recorded.

Effect of treatment with LUCITONE 119 on blood elements: Table 01 summarizes the results of the changes in blood stored in Wistar rats after treatment with LUCITONE 119 to 07 days and 21 days.

From this table, we see that the levels of GR in control animals at 07 and 21 days are the same. A decline of 0.8 x 106.µl-1 is observed in the treated after 21 days of treatment. Concerning the content of HB, the same observations are recorded for the time of treatment,

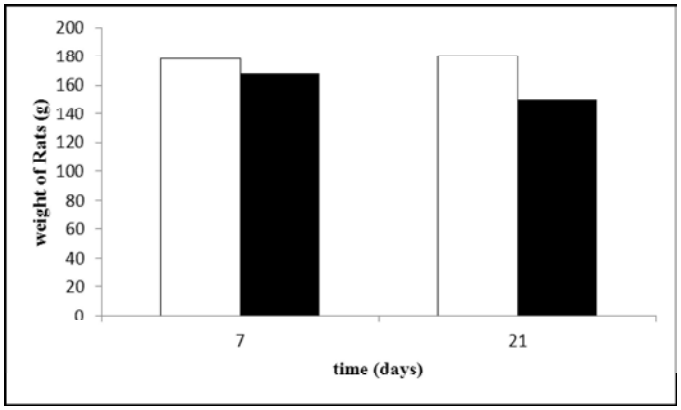

Fig. 02: Changes in average weights of Wistar rats after treatment by the LUCITONE 119 for 07 and 21 days.

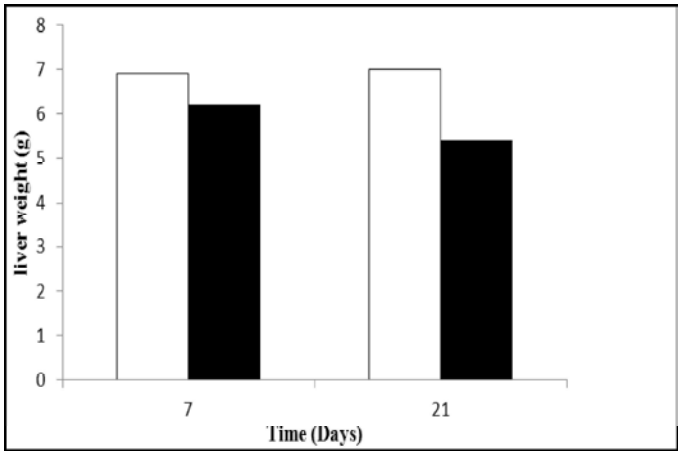

Fig. 03: Changes in average weight of the liver after treatment by the LUCITONE 119 for 07 and 21 days.

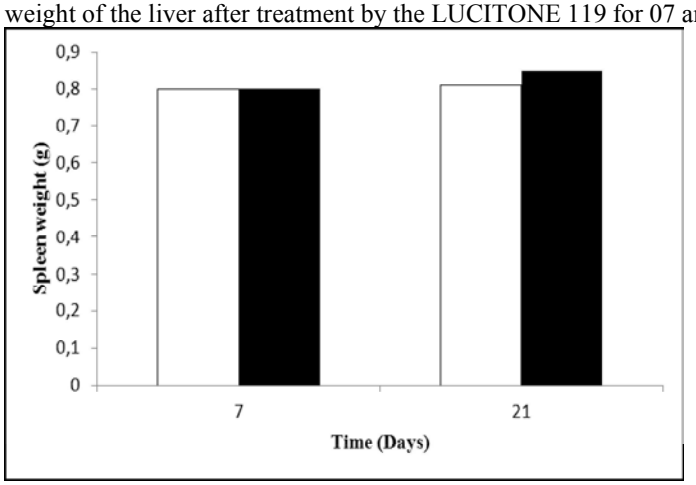

Fig. 04: Changes in average weight of the spleen after treatment by the LUCITONE 119 for 07 and 21 days.

Table 01: Changes in cellular blood of Wistar rats after treatment by the LUCITONE 119 for 07 and 21 days

	GR ($10^6.\mu l^{-1}$)		HB ($g.dl^{-1}$)		THROM ($10^3.\mu l^{-1}$)		HT (%)		LYMPH (%)		MONOC (%)		GRANUL (%)	
Time (Days)	C	Tr	C	Tr	C	Tr	C	Tr	C	Tr	C	Tr	C	Tr
07	8.2	8.0	15.5	15.2	700	400	44	42	52	65	7.7	9.3	37	16
21	8.2	7.4	14	13.8	690	380	44	40	53	72	9,6	9	35	13

GR: red blood cells. HB: Hemoglobin. THRB: Platelets. HT: hematocrit. LYPT: Lymphocytes. MONCE: Monocytes. CBNRM: Granulocytes:

Table 02: Changes in hematological parameters of Wistar rats after treatment by the LUCITONE 119 for 07 and 21 days

	VGM (fl.)		TCMH (pg)		CCMH ($g.dl^{-1}$)	
Time (Day)	C	Tr	C	Tr	C	Tr
07	56,5	58,6	17,9	18,7	31,6	31,8
21	56,7	52,1	17,9	19,3	31,6	37,2

MCV: mean corpuscular volume. MCH: mean corpuscular hemoglobin. MCHC: mean corpuscular hemoglobin concentration.

07 and 21 days. The results for the rate of platelet recorded show that highly significant decrease in the average rate of platelets in the treated groups to the resin Lucitone199 is observed.

Changes in rates of VAT registered on the 7th day of treatment show an insignificant difference in the rate of hematocrit in the group treated with resin Lucitone199 compared to the control group. This difference becomes significant in the group treated for 21 days. On lymphocytes, the results show a very highly significant difference between treatment and control groups in the resin Lucitone199, particularly after 21 days of treatment. Treatment with 119 LUCITONE rats causes a significant decrease in treated rats particularly at 07 days to 2 days this difference becomes negligible. Finally, the results of changes in rates of granulocytes show a very highly significant difference between the rates among those treated and control animals is observed.

Effect of treatment with LUCITONE 119 on hematological parameters: Table 02 summarizes the results of changes in hematologic parameters recorded in Wistar rats after treatment with LUCITONE 119 to 07 days and 21 days.

At day 7 of treatment, a marginally significant increase in the rate of mean corpuscular volume is recorded. After 21 days of treatment, there was a significant decrease in MCV. The results of changes in mean corpuscular hemoglobin showed an increase remains insignificant. Finally, changes in mean corpuscular hemoglobin concentrations showed no significant changes at 07 days. However, a sharp increase in these concentrations is observed at 21 days of treatment (approximately 25%).

DISCUSSION

Acrylic resins are still the material of choice in the manufacture bases and dental prostheses. In this sense also that our study is undertaken, it concerns the search for potential toxic effects of substances entering the composition of its resin particularly LUCITONE 119. Two aspects were examined in our study, the first concerns the effects of LUCITONE on some physiological parameters and the second concerns a very little understood: the effects of this potential hematotoxic resin on the treated animals.

Whatever the route of administration or the species studied the hematopoietic system is the target organ effects of xenobiotics in general, blood is a circulating tissue and it carries all foreign substances.

The methyl methacrylate monomer has a half life of blood clearance from 47 to 55 minutes [10]. This substance tends to accumulate in the spinal cord [11]. Bibliographic data are supporting the results obtained in our work, in fact, we were able to demonstrate a disturbance of hematological profile of the treated animals, this disturbance was first illustrated by thrombocytopenia among treatment groups in the resin Lucitone199 for 07 and 21 days. The decrease in platelet count recorded is a major indicator reflecting an impairment of the bone marrow, immune dysfunction and a significant poisoning by methyl methacrylate [12, 13].

Our results also showed a significant decrease in hematocrit in the group treated for 21 days accompanied by a slight decrease in the rate of red blood cells and hemoglobin, a result is often explained by anemia described in species poisoned to organic compounds [14, 15]. In our case, the decrease in red blood cells and hemoglobin recorded was not significant. If the hematocrit provides information on the health of animals, its value does not prejudge the immunocompetence of individuals [14].

The results obtained with the levels of lymphocytes, monocytes and granulocytes show a lymphocytosis associated with monocytosis, this anomaly is associated with the penetration of foreign bodies in the body, causing its removal by phagocytosis of infected cells [16, 17]. Eosinophil concentrated easily in sites of allergic reactions [18-21]. In our work, there is also an overproduction of white blood cells which results in eosinophilia sometimes important: the resin has a Lucitone199 allergenic and can cause allergic eczema.

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