

## Effect of mastic tree(*Pistacia lenticus*) resins on some blood parameters in rabbits

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### Abstract

This study was designed to evaluate the physiological effects of the mastic tree (*Pistacia lenticus*) resins on some blood parameters in rabbits. Fourteen local domestic rabbits were used, were randomly assigned into two equal groups :control and treatment groups. Treated animals were received mastic tree resin as infusion at a dose of 2g\ rabbit daily for seven days. The studied blood parameters have been estimated at the end of experiment period. The results showed that the use of mastic tree lead to significant increase in RBC, Hb, and MCHC, significant decrease in WBC, MCV, MCH and PLT count, and insignificant changes in the percentage of PCV, monocytes and lymphocytes, and decrease in the granulocytes percentage.

### Introduction

*Pistacia lenticus* is an evergreen tree of the Anacardiaceae family (1), mastic is a natural resinous exudates obtained from the stem and main leaves (1,2,3) it had been used extensively for countries in Mediterranean and Middle Eastern countries both as a dietary supplement and as a herbal remedy (3,4). The major constituent of mastic gum is resin of *pistacia lenticus* (1). Resins are composed of about 90% of mastic, and volatile oil 1-3 % (4). The total mastic extract without polymer consists of an acidic fraction and a neutral one, after several chromatographic separations afford the major triterpenic acids : oleanonic acid , moronic acid, masticdienonic acid , isomasticadenonic acid, masticdienolic acid, and isomasticdienolic acid , While the neutral fraction afford: triucallol, dammaradienone , 28 norlean-12-en-3-one , oleanonic aldehyde , and oleanolic aldehyde (1) protein analytical methods indicated presence of highly glycosylated protein backbone, the electrophoretically separated molecules revealed the existence of arabinose and galactose (5). In the traditional medicine mastic has been

used to relief of upper abdominal discomfort, dyspepsia and peptic ulcer (3) and duodenal ulcer, and used as a temporary filling for carious teeth, treatment of ring worm, muscular stiffness, and diarrhea in children (6, 7) . Recent medical trials have shown that mastic gum have cytoprotective or antacid effects for gastrointestinal system such as relief ulcers and reducing the intensity of gastric mucosal damage caused by antiulcer drugs and aspirin with little or no side effects (6). (1) found that the acidic fraction was most active antibacterial extract , and the most active pure compound was isomasticdienolic acid . (8) showed that mastic powder could have a hepatoprotective and cardioprotective role in vivo in human. (9) noted that the essential oils of mastic are natural antimicrobial agents currently used in medicine owing to their antioxidant , antimicrobial and hepatoprotective properties. (10) found that mastic gum exhibited a strong in vitro potency to attenuate the expression and function of androgen receptors in prostate cancer.

### Materials and methods

#### plant collection and preparation:

We used this experiment the herbal plant mastic tree *pistacia lenticus* resin. The resin of mastic tree has been brought from the local herbal market and

grinded it very well until it became as a powder to be used in the experiment.

#### Experiment Design:

Fourteen healthy local domestic rabbits had been used in this experiment they divided into two equal groups:

a-Control group(C): Rabbits were fed on standard feed.

b-Treatment group(T): Rabbits were fed on standard feed plus mastic tree resin at a dose of 2g / rabbit twice daily for one week (11) as an infusion.

#### Parameters used in the experiment:

Blood samples has been drawn by direct cardiac puncture from conscious animals at the end of the experiment, these samples collected in EDTA tubes, serum samples were separated and analyzed by ( Auto Hematology analyzer, Horiba, France) according to Hendrix and Sirois method (12).The blood parameters were estimated include:

The results revealed that the use of mastic tree resins at a dose of 2g / rabbit twice daily for seven days in comparison to the control group leads to significant decrease ( $p < 0.05$ ) in total white blood cells count ( $10^3/\text{mm}^3$ ) in comparsion with the control group, total WBC count with standard error was ( $3.35 \pm 0.42$ ) for treatment group versus ( $5.05 \pm 0.32$ )for control group.The differential WBC count ( % ) showed insignificant increase both types of a granulocytes (monocytes and lymphocytes) percentages, the means with standard errors were ( $14.1 \pm 1.36$ ) and ( $37.9 \pm 4.45$ )for monocytes and lymphocytes respectively in treatment group, while the control group means with standard errors were ( $14.0 \pm 1.49$ ) and ( $35.18 \pm 2.97$ )for monocytes and lymphocytes respectively. Granulocytes (%) results revealed insignificant decrease ( $p > 0.05$ ), the mean with standard error for the treatment group was ( $47.9 \pm 5.06$ ) versus ( $50.8 \pm 3.82$ ) for control group.The RBC count ( $10^6 / \text{mm}^3$ ) revealed a significant increase( $p < 0.05$ )in RBC count in the treatment group, the mean was ( $5.96 \pm 0.35$ ) with standard error versus

#### 1- White Blood Cells:

Total WBC count ( $10^3 / \text{mm}^3$ ), lymphocytes count (%), monocytes count (%) and granulocytes count (%).

#### 2- Red Blood Cells:

Red blood cells count ( $10^6 / \text{mm}^3$ ), hemoglobin concentration (g/ d L), packed cell volume (PCV)(% ), mean corpuscular volume (MCV) ( $\mu\text{m}^3$ ),mean corpuscular hemoglobin ( MCH ) ( pg ), and mean corpuscular hemoglobin concentration (MCHC)(%)

#### 3- Platelets:

Platelets count ( $10^3 / \text{mm}^3$ ).

**Statistical Analysis:-** The results had been analyzed with *t*-test between groups.

### Results

( $5.5 \pm 0.22$ ) for control group. Hemoglobin concentration(g/dL) was significantly increased ( $p < 0.05$ )in the treatment group ( $10.1 \pm 0.62$ ) in comparison with the control group( $9.5 \pm 0.39$ ).The packed cell volume (%) was increased in the treatment group ( $36.4 \pm 2.31$ ) versus ( $35.3 \pm 1.23$ ) for control group, but this increase did not reach to a significancy level . In corresponding with RBC indices, the mean corpuscular volume( $\mu\text{M}^3$ ) was significantly decreased ( $p < 0.05$ ) in the treatment group, it was( $60.7 \pm 0.26$ ) in comparison with ( $64.5 \pm 0.35$ ) for control group. The mean corpuscular hemoglobin (pg) was significantly decreased( $p < 0.05$ ) they were ( $16.9 \pm 0.08$ ) and ( $17.3 \pm 0.07$ ) in treatment and control groups, respectively. While the results of mean corpuscular hemoglobin concentration (g/dL)was significantly increased( $p < 0.05$ )which was ( $27.81 \pm 0.08$ ) in treatment group versus ( $26.97 \pm 0.16$ ) for the control group.Platelets count ( $10^3 / \text{mm}^3$ ) was decreased significantly ( $p < 0.05$ ) in the treatment group ( $160.85 \pm 31.60$ ) in comparison with the control group, the mean with standard error was ( $481.28 \pm 41.98$ ).

### Discussion

Hematology testing provide accurate and reliable clinical laboratory results to evaluate disease status (12,13,14) and assessment of general health condition of animals (14, 15) and in diagnosis of

various animal disease(16).CBC is a basic screening test and it is one of the most frequently ordered laboratory procedures, the findings in the CBC give valuable information about the hematologic and

other body systems, prognosis, response to treatment and recovery(17). Mastic tree resin extract did not used in this experiment, because the total mastic extract contain insoluble polymer cause the extract to be sticky in consistency, this consistency would lead to difficulties in extract administration (1), so we used mastic tree resin powder as an infusion, which consider to be the medicinal part in the plant (4). The total leukocytes count in this study revealed that the treatment group have leucopenia . Leucopenia is absolute decrease in total WBC count bellow 4000 cell per cubic millimeter. This leucopenia may be due due to viral, bacterial infection or bone marrow disorders(18) , or the leucopenia may be attributed to the diuretic , analgesic, and anti-inflammatory effects of mastic tree resins (6).(17) found that the administration of some drugs such as analgesics , diuretics, and anti-inflammatory drugs had been associated with leucopenia. The differential leukocytes count results revealed that the decrease in WBC count was account for granulocytes (neutrophils, basophiles and eosinophils) which were decreased insignificantly, not for a granulocytes (lymphocytes and monocytes) which were increased insignificantly . The results of other workers supported our results . (5) found that the administration of mastic gum at a dose 1g daily for two months both *in vivo* and *in vitro* had been caused decrease neutrophils activation, and they attributed this effect to the formation of a specific binding of arabinogalactan proteins of mastic gum to two membrane proteins of neutrophils, possibly suggesting inhibition of neutrophils activation.(19) mentioned that the use of *pistacia lenticus* trees stem and leaves inhibit the eosinophilia that associated with allergic condition in mice by the inhibition of eosinophils recruitment. The total erythrocytes count showed significant increase in treatment group, this increase in RBCs count may be attributed to the effect of mastic tree resins in stimulation of erythropoiesis

(17) due to stimulation of erythropoietic hormone secretion from kidneys which stimulate bone marrow to begin formation of new erythrocytes ( 20 , 21 ). Or the erythrocytosis may be due the automated analyzer cell counter used in this experiment which often use the size of the particles passing through apparatus as a method of counting cells, so when there is a decrease in MCV(microcytosis) this could lead to increase total RBC count(12). Hemoglobin concentration in treatment group was also significantly increased, this may be owing to the increase the rate of erythropoiesis and increase release of stored iron from bone marrow (22). Our results revealed increase in RBCs count and decrease in MCV. Since the packed cell volume depends on the total RBCs count and MCV(23), so this interprets the insignificant increase in PCV in treated group. The increase in last three parameters(RBC, Hb, and PCV) indicates that there is no anemia, and indicates increase in erythropoiesis and biosynthesis of hem in bone marrow. The results of this study revealed a significant decrease in both MCV and MCH, and a significant increase in MCHC, this results indicates that erythrocytes was microcytic and hypochromic. The significant microcytosis associated with erythrocytosis as we mentioned previously . The decrease in MCH may be owing to decrease absorption of iron due to increased stored iron in the body (24) which lead to inhibition of its absorption then decrease hemoglobin concentration in erythrocytes(25). The decrease in MCH is associated with MCV, because any decrease in MCH will lead to decrease in MCV and vice versa (26). In spite of the significant decrease in platelets count between the two groups of our experiment, but it still remaining within the normal ranges ( $100 - 400 \times 10^3 / \text{mm}^3$ ) this indicates no thrombocytopenia, but this differences in PLT between treatment and control group may be resulted from the decrease platelets production in bone marrow(18). We

concluded from this study that the administration of mastic gum resins in rabbits with a dose of 2 g /rabbit twice

daily may be affect the bone marrow and resulted in alterations of the hemopoiesis processes increasingly and decreasingly.

Table (1): Effect of mastic tree(*Pistacia lenticus*) resins on TLC, DLC, RBC count, RBC indices, and PLT count (means  $\pm$  standard errors) in rabbits.

Groups Parameters	Control	Treated with mastic tree
WBC ( $10^3/\text{mm}^3$ )	5.05 $\pm$ 0.32 a	3.35 $\pm$ 0.42 b
Monocytes (%)	14.0 $\pm$ 1.49 a	14.1 $\pm$ 1.36 a
Lymphocytes(%)	35.18 $\pm$ 2.97 a	37.9 $\pm$ 4.54 a
Granulocytes(%)	50.8 $\pm$ 3.82 a	47 $\pm$ 5.06 a
RBC ( $10^6/\text{mm}^3$ )	5.05 $\pm$ 0.22 a	5.96 $\pm$ 0.35 b
Hb (g/dl)	9.5 $\pm$ 0.39 a	10.1 $\pm$ 0.62 b
PCV (%)	35.3 $\pm$ 1.23 a	36.4 $\pm$ 2.31 a
MCV( $\mu\text{m}^3$ )	64.5 $\pm$ 0.35 a	60.7 $\pm$ 0.26 b
MCH(Pg)	17.3 $\pm$ 0.07 a	16.9 $\pm$ 0.08 b
MCHC(g/dL)	26.97 $\pm$ 0.16 a	27.81 $\pm$ 0.08 b
PLT( $10^3/\text{mm}^3$ )	481.28 $\pm$ 41.98 a	160.85 $\pm$ 31.60 b

\*The different small letters refer to significant differences between groups ( $p < 0.05$ ).

\*The similar small letters refer to significant differences between groups ( $p < 0.05$ ).

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## تأثير راتنجات العلك المر في بعض المعايير الدموية في الأرانب

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### الخلاصة

صممت الدراسة الحالية لتقييم التأثيرات الفسلجية لراتنجات العلك المر في بعض المعايير الدموية في الأرانب، ولتحقيق هذا الهدف تم استخدام أربعة عشر أرنباً محلياً تم توزيعها عشوائياً على مجموعتين متساويتين في العدد هما مجموعة السيطرة والمجموعة المعاملة براتنجات العلك المر، تناولت الأخيرة راتنجات العلك المر فمويًا بجرعة 2غم لكل أرنب مرتان يوميًا لمدة سبعة أيام وبعد انتهاء مدة التجربة تم قياس بعض المعايير الدموية . أظهرت نتائج هذه الدراسة بأن تناول راتنجات العلك المر أدت إلى زيادة معنوية في كل من العدد الكلي لكريات الحمر، وخضاب الدم ومعدل تركيز الخضاب في الكرية وانخفاضاً معنوياً في العد الكلي لخلايا الدم البيض، ومعدل حجم الكرية، ومعدل خضاب الكرية، وعدد الصفائح الدموية، وزيادة غير معنوية في النسبة المئوية للخلايا اللمفية والوحيدة ومكداس الدم، وانخفاضاً غير معنوي في النسبة المئوية للخلايا الحبيبية.