



## Effect of Tomato Juice on some Biochemical Parameters in Pregnant Rat

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### ABSTRACT

The number of phytochemicals in tomatoes may be significant, given their long history of medical usage. Anemia and how they are related Prolonged iron shortage might have detrimental effects. Four groups of twenty-four pregnant rats were placed apart and left for a month. (meal time), with groups (2, 3, and 4) receiving juice therapy and group (1) acting as the comparison group.

The results showed that the use of tomato juice increased hemoglobin levels. Furthermore, they showed a significant decrease in malondialdehyde (MDA) and a significant rise in blood images and antioxidant enzymes like GSH as compared to the control +ve group. The rats with anemia who were treated with tomato juice recovered the most. The nutritional value and antioxidant activity of tomato juice may be responsible for these outcomes. To sum up, giving rats tomato juice may considerably lower anemia.

**Keywords:** tomato juice, FSH, LH, rats pregnant, antioxidant enzymes.

## INTRODUCTION

In reality, tomatoes are a fruit used to complement iron, folic acid, and vitamins. Despite Being non-vegetable, they are loaded with many health benefits for the physical body. Tomatoes are incredibly healthful, and with so many different ways to prepare them, there's no excuse not to include them in your diet (Werner, 2022). Tomatoes are recognized for their elevated lycopene concentration, one of their best benefits.

An essential antioxidant, lycopene aids in the prevention of malignant cell growth as well as a host of other illnesses and health issues. High quantities of lycopene can help flush out free radicals in the body; the tomato gets its rich red color from this essential antioxidant (Hosseini *et al.*, 2023). Although they come in round, oval, and "cherry" varieties, all tomatoes are nutritious and a high source of potassium, phosphorus, magnesium, and iron. which are essential for healthy nerve and muscular function (Lotfy, 2020).

Owing to their elevated levels of tomatoes, which are high in beta-carotene and pro-vitamin A, rank fourth in the human diet for vitamin A and third for vitamin C (Thaer *et al.*, 2020). Homocysteine is eliminated with the aid of enzymes whose metabolism is dependent on the metabolism of B complex vitamins, especially folic acid (Tyagi *et al.*, 2023). Phytosterols are substances that assist manage cholesterol. This is very strong proof that eating tomatoes has a ton of amazing health advantages. To receive all of lycopene's benefits, A volume of up to 540 milliliters of liquid tomato product is needed to this suggests that consuming a drinking a glass of tomato juice every day may lengthen one's life (Oyesuntimi, 2023). The nutritious content of fresh tomatoes is identical to that of other varieties. Tomato products that have been heated actually have more lycopene available to the body than less. The medical science community recognizes that we have not yet completely realized the potential that tomatoes provide, therefore despite the abundance of study on the health advantages of tomatoes, additional research is being done (Harutyunyan *et al.*, 2022). Tomato eating and tomato B consumption are quite likely, as research is gradually demonstrating. Inhaling Hydrochloride Phenylhydrazine Wheezing or dyspnea may be brought on by phenylhydrazine hydrochloride's nose, throat, and lung irritation. The liver and kidneys could be harmed by phenylhydrazine hydrochloride. There is insufficient evidence to support the theory that phenyl hydrazine hydrochloride causes cancer in animals. Leukemia could result from it (Hotez *et al.*, 2008).

Thus, the current study aimed to determine how tomato juice affected several hematological and biochemical markers in pregnant rats.

## MATERIALS AND METHODS

The date of conducting the study was 2<sup>nd</sup> of March -2<sup>nd</sup> of April at 2023. Twenty-four Sprague-Dawley albinos, pregnant rats, weighing between 100 and 200 g, were acquired from Mosul University's veterinary college. In Mosul, Iraq, we purchased tomato juice from the neighborhood shops. ELISA biochemistry analytical kit.

Parameters	Company name	Type assay	Catalog number or Code
MDA	CELL BIOLABS, INC Creating solution for life science research	Adduct competitive ELISA	STA-832
GSH	Elab Science	Competitive ELISA	E-E-0026
TG	BIOTANG Lab supply professional	Sandwich ELISA	R6954
Cholesterol	CELL BIOLABS, INC Creating solution for life science research	Manual data sheet Fluorometric	AT.NU: STA-390
FSH	BT.LAB Bio assay Technology Laboratory	Competitive ELISA	EA0015Ra
LH	BT.LAB Bio assay Technology Laboratory	Competitive ELISA	EA 0013Ra
Prolactin	BT.LAB Bio assay Technology Laboratory	Sandwich	E2212Ra

### Experimental design:

After a week of acclimation, the test rats were split into four groups. The animals had been cared for according to standard procedures. For every animal, there was food and water available. Six rats comprised the first group, which was kept as the control group. Tomato juice was the only liquid utilized to gavage the second, third, and fourth groups.

### Hematological parameter analysis

After four weeks of treatment, the patient was put to sleep and had all of his blood removed from the retro-orbital plexus. Biochemical markers in one area and hematological testing in another (Jaiswal *et al.*, 2014).

## RESULT AND DISCUSSION

There are no citations and comparison of research results with previous studies. Note that the research idea was developed and studied.

(Table 1) shows the impact of tomato juice on a number of hematological and biochemical parameters. Significant increases were seen in the hematological parameters for thrombocytopenia (PLT), white blood cells (WBCs), and erythrocytes (RBCs). This evaluation significantly increased as the dose and concentration of tomato juice were increased. In contrast to the control (RBC  $3.427 \pm 0.369$ ), WBC =  $2.435 \pm 0.49$ , PLT =  $1.321 \pm 256$ , and RBCs  $1.011 \pm 5$ , WBCs  $1.102 \pm 7.4$ , and PLT =  $0.121 \pm 290$  in (4.5 ml/Kg.BW) tomato juice, the content of triglycerides and cholesterol significantly decreased. Anemia and the relationship between it a prolonged iron deficiency may have serious repercussions. Glutathione suppressed the activity of female antioxidant enzymes and GSH (Sahoo and Chainy, 2023). The results showed that using tomato juice raised hemoglobin levels. They also compared to the control +ve group, showed a significant increase in antioxidant enzymes such glutathione-peroxidase, superoxide dismutase, catalase, and glutathione S-transferase, as well as hemoglobin and blood image. The tomato juice groups of rats with anemia demonstrated the best recovery from treatment (Lotfy, 2020).

Moreover, our findings concur with those of Alkattan *et al.* (2018), who observed reductions in cholesterol and triglyceride levels along with improvements in PCV, hemoglobin concentration, WBC, and RBC. When compared to the control positive group, tomato juice had lower mean values for triglycerides (TG), LDL-C, VLDL-c, and total lipid (TL). Nonetheless, the mean LDL-c readings of the rats treated with tomato sauce were greater than those of the Positive control group (lofty, 2020).

The outcomes align with multiple investigations that discovered tomatoes to increase HDL-c and decrease LDL-c, triglyceride, and total cholesterol levels (Rezapour *et al.*, 2022). The study conducted by Ibrahim *et al.* (2008) examined the effects on rats' body weight, lipid profiles, liver enzymes, and atherogenic index of three distinct tomato products: Paste, powder, and tomato catchup paste. The outcomes demonstrated that, while all three products had a substantial good therapeutic effect on the rats, The tomato paste and catchup paste showed the biggest overall benefits. In a study conducted by Blum *et al.* (2006), 16 men and 32 women followed a 300 g daily high-tomato diet. The results demonstrated that the blood HDL-c level (15.2%) was significantly ( $P < 0.05$ ) raised by the diet. They also found a decrease in LDL-c, VLDL-c, triglycerides, cholesterol, and even though these decreases were not statistically significant. Mice's cholesterol dropped by 15% when the health effects of tomatoes were examined (Bobeketal, 1998).

**Table 1: The impact of tomato juice on a number of hematological and biochemical Parameters**

Groups/standarded	Control	2.5 ml/Kg.Bw Tomato juice	3.5 ml/Kg.Bw Tomato juice	4.5 ml/Kg.Bw Tomato juice
RBC 3.5-5.5 $10^{12}/L$	3.427 $\pm$ 3.69 C	2.231 $\pm$ 3.5 C	2.110 $\pm$ 4.2 B	1.011 $\pm$ 5 a
WBC 4-11 $10^9/L$	2.435 $\pm$ 4.9 c	2.203 $\pm$ 4.5 c	1.132 $\pm$ 5.7 b	1.102 $\pm$ 7.4 a
PLT 150-450 $10^9/L$	1.321 $\pm$ 256 b	1.213 $\pm$ 103 c	1.112 $\pm$ 257 B	0.121 $\pm$ 290 a
Hb concentration 100 ml/gm	0.11 $\pm$ 11.26 d	0.23 $\pm$ 12.53 c	0.16 $\pm$ 13.37 b	0.11 $\pm$ 13.8 a
Cholesterol concentration mg/100ml	2.85 $\pm$ 181.13 a	3.63 $\pm$ 173.99 b	0.89 $\pm$ 162.81 c	2.39 $\pm$ 151.47 d
Triglycerides Mg/100 ml	4.18 $\pm$ 202.33 a	3.21 $\pm$ 144.81 b	1.74 $\pm$ 141.51 b	2.31 $\pm$ 134.26 c

\*  $\pm$  SE the number followed by vertically different letters (a, b, c, d) indicate the presence of significant differences between them at the probability ( $P < 0.05$ ) and vice versa according to the Duncans test.

The effects of tomato juice on various antioxidants and body weight were displayed in (Table 2) before and after treatment. The results showed that there was an increase in glutathione (GSH) in the juice (0.10 $\pm$ 3.9) but a significant decrease in the amount of malondialdehyde (MDA) (7.23 $\pm$ 296.16) in 4.5 ml/Kg BW tomato juice when compared to the control (0.10 $\pm$ 2.54).

After treatment, body weight was 2.18 $\pm$ 230.12 (2.5 ml/Kg BW) of tomato juice nevertheless, the concentration was lower than in the control group. These findings are in line with those of Alkattan *et al.* (2018), who observed that all groups that dipped in tomato juice had lower BW both before and after treatment, along with decreased MDA and increased GSH.

**Table 2: Effect of tomato juice on some antioxidants and body weight after treatment in rat pregnant**

Groups/stander	Control	2.5 ml/Kg.Bw Tomato juice	3.5 ml/Kg.Bw Tomato juice	4.5 ml/Kg.Bw Tomato juice
GSH	0.10 $\pm$ 2.54 c	0.11 $\pm$ 3.25 b	0.11 $\pm$ 3.4 b	0.10 $\pm$ 3.9 a
MDA	0.51 $\pm$ 368.52 a	0.74 $\pm$ 312.37 b	1.52 $\pm$ 301.2 c	7.23 $\pm$ 296.16 d
Body weight after treatment	3.17 $\pm$ 283.80 b	2.18 $\pm$ 230.12 a	2.65 $\pm$ 224.15 d	3.63 $\pm$ 263.17 c
Body weight	2.13 $\pm$ 246.50 a	3.16 $\pm$ 234.13 b	1.11 $\pm$ 210.47 b	0.96 $\pm$ 189.96 c

\*  $\pm$  SE the number followed by vertically different letters (a, b, c, d) indicate the presence of significant differences between them at the probability ( $P < 0.05$ ) and vice versa according to the Duncans test.

(Table 3) displays the impact of tomato juice on several hormones in pregnant rats. Notably, both luteinizing hormone (LH) and follicle stimulating hormone (FSH) significantly increased (FSH 1.45 $\pm$ 0.07, LH 1.17 $\pm$ 0.05). Prolactin significantly dropped in the 4.5 ml/kg BW tomato juice group when compared to the control group.

**Table 3: Tomato juice's impact on several rat pregnant hormones**

GROUPS/Standar	Control	2.5 ml/Kg.Bw Tomato juice	3.5 ml/Kg.Bw Tomato juice	4.5 ml/Kg.Bw Tomato juice
FSH	1.35±0.09 a	1.24±0.02 c	1.30±0.02 b	1.45±0.07 a
LH	1.14±0.07 a	1.29±0.02 c	1.23±0.03 b	1.17±0.05 a
Prolactin	2.89±0.01 a	1.72±0.12 b	1.62±0.17 b	2.00±0.11 b

\* ± SE the number followed by vertically different letters (a, b, c, d) indicate the presence of significant differences between them at the probability ( $P < 0.05$ ) and vice versa according to the Duncans test.

### CONCLUSION

One of the best things about tomatoes is that they have a high content of lycopene. Lycopene is a vital antioxidant that helps prevent the growth of cancerous cells and a variety of other diseases and health problems. High lycopene concentrations can aid in the body's removal of free radicals. The inference derived from the current work signifies that even small doses (2.5, 3.5, 4.5 ml/kg) of tomato juice is capable of producing supportment with blood pictures and some biochemical parameters. Hence, tomato juice can be relied upon during pregnancy, as it is beneficial, safe and enhances immunity in the body according to the doses mentioned.

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## تأثير عصير الطماطم في بعض المعايير الكيموحيوية في حوامل الجرذان

مها خلف علي الجبوري

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### الملخص

قد تكون وفرة المواد الكيميائية النباتية الموجودة في الطماطة كبيرة، ونظرا لتاريخها الطويل من الاستخدام الطبي. فإن فقر الدم وكيفية ارتباطه بنقص الحديد لفترة طويلة يكون له آثارا ضارة . تم تقسيم أربع مجموعات مكونة من أربعة وعشرين انثى جرذاً حاملاً لمدة شهر (مدة التجريب)، حيث تجرع المجموعات (2، 3، 4) بالطماطة جرعة مزدوجة، وتبقى المجموعة (1) كمجموعة سيطرة. ظهرت النتائج أن استخدام عصير الطماطم أدى إلى زيادة مستويات الهيموجلوبين. وعلاوة على ذلك، فقد أظهرت انخفاضاً كبيراً في مادة مالونديالدهيد كما (GSH) وارتفاعاً كبيراً في صور الدم والإنزيمات المضادة مقارنة بالمجموعة السيطرة. وقد تعافت الجرذان المصابة بفقر الدم والتي عولجت بعصير الطماطم بشكل أكبر. قد يعود هذا الى القيمة الغذائية ونشاط مضادات الأكسدة في عصير الطماطم مسؤولة عن هذه النتائج. في الختام، قد يؤدي إعطاء الفئران عصير الطماطم إلى خفض فقر الدم بشكل كبير.

الكلمات الدالة: مضادات الاكسدة، حوامل الجرذان، LH ، FSH، عصير الطماطم.