

## Effect Of *Citrullus Lanatus* Juice On Hemoglobin, Red Blood Cells And Liver Enzyme; An Experimental Study

Shahid Ali, Nuzhat Sultana, Muslim Abbas, Zareen Naz, Muhammad Akbar Hassan, Muhammad Abid

### ABSTRACT:

**Objective:** To determine effect of *Citrullus lanatus* juice on hemoglobin and Serum Glutamic Pyruvic Transaminase (SGPT) level.

**Study design and setting:** It was an experimental study conducted on healthy rabbits for sixty days in the research department of pharmacy University of Karachi.

**Methodology:** Current study was planned to evaluate effect of *Citrullus lanatus* juice on red blood cells, hemoglobin and liver enzyme. 60 days study was performed at 2 different doses i.e 3 and 6ml/kg on rabbits. These rabbits were from either gender and were divided into 3 groups their weight ranges from 1200 to 1800 grams. Group A is control group (Normal saline 6ml/kg), Group B is treated group (3 ml/kg), Group C is treated group (6ml/kg). After taking mean of all values they are compared with control group. Significance of mean can be estimated by Tukes Post Hoc Test.  $P < 0.05$  estimated as significant.

**Results:** It was found that count of red blood cells rises significantly along with rise in hemoglobin level. As far as liver enzyme serum glutamate pyruvate transaminase (SGPT) was concerned its concentration decreases slightly.

**Conclusion:** *Citrullus lanatus* juice contain ingredients which are important for RBC hemoglobin and synthesis. It also contains important antioxidants that have organoprotective role due to which SGPT level decreases even in healthy animals as compared to control groups.

**Key words:** *Citrullus lanatus*, Red Blood Cells, Hemoglobin, SGPT

### INTRODUCTION:

World health and food agriculture organization propose better diet for every person which should include diet rich in fiber, less amount of fat, carbohydrates in the form of fruits and vegetables and their daily intake should not be less than 400gm, daily diet should also include cereals and legumes not less than 30gm<sup>1</sup>. Vegetables and fruits are the major source of vitamins for human being and animals. Only fresh pulp of fruit consumed while leaving seeds and

rinds in most countries. Fruits comprise of 85% water, small varying amount of fats proteins and carbohydrates are also present, carbohydrates comprises of cellulose while small amount of starch and sugar is also present. Micronutrients are richly present in fruits which includes carotene or provitamin A, Ascorbic acid, Vitamin k, Riboflavin, Iodine, Iron and other minerals<sup>2</sup>.

*Citrullus lanatus* fruit is also called as Egusi watermelon, Egusi melon, Desert watermelon, West African watermelon and cooking melon<sup>3</sup>. It belongs to *Cucurbitaceae* family<sup>4</sup>. The plant of *Citrullus lanatus* is ascending or scramble up nature. It is yearly plant with many herbaceous. Stem of plant is hard and sturdy having length of about 3 meter; older part of plant is lacking hair while young fresh parts have yellow to brownish dense woolly hairs. Leaves of plant are 60 to 200mm in length and 40 to 150mm in breadth having both rough surfaces, these leaves are usually lobed or double lobed having largest central lobe. Stalks of leaves are hairy having length of 150mm. single plant contains flowers of both male and female sex (Monoecous). Stalk of flower is hairy having length of 40mm. Shape of fruit is usually subglobose having diameter of about 200mm and its stalk is 50mm in length<sup>5,6,7,8</sup>.

It is evident from history that watermelon was first harvested 5000 years ago in Egypt and then it spreads to different parts of world. China is considered as highest grower of watermelon presently followed by other countries like Korea, Turkey, Iran and USA<sup>9,10,11</sup>.

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Nutritional values of 100gm of watermelon consumption yields 30 kcal. Water content is 92%, carbohydrates 7.55% out of which sugar is 6.2% and dietary fiber includes 0.4%. It is also rich source of Caretroids, Flavonoids and Citrulline. Watermelon is cholesterol and fat free therefore considered as fruit of low calories<sup>12,13</sup>. Watermelon also contains different minerals like calciu about 8mg, phosphorus 9mg and iron 0.17 mg vitamins include ascorbic acid 9.6 mg, folate 2mg, niacin 0.2 mg, riboflavin 0.02 mg and thiamine 0.08 mg<sup>14</sup>.

Concentration of different amino acids in watermelon juice in mg/l includes: Arginine, 1150; Citrulline, 2014; Glutamine, 172; Phenylalanine, 89; Histidine, 88; Isoleucine, 87; Valine, 78; Cysteine, Above distribution shows that 71% of amino acids in *Citrullus lanatus* juice consist of Arginine and Citrulline<sup>15</sup>. Caretroid is sufficiently present in fruits and vegetables it is bright red in color and play its major role as anti.oxidant. *Citrullus lanatus* yield high amount of caretroids such as beta cryptoxanthine, lycopene, beta carotene, and vitamin E, these caretroids are proved to protect body from damage to free radicals<sup>16</sup>.

Natural anti-oxidants are sufficiently present in watermelon which includes lycopene citrulline and ascorbic acid. These anti-oxidants protect human body from chronic diseases such as tumor and heart diseases<sup>17,18,19</sup>. *Citrullus lanatus* can also be used in herbal medicine for prevention of some pathological conditions like erectile dysfunction, as antihypertensive and as an antioxidant. It can be used for the treatment of jaundice, hepatomegaly and act as source of energy<sup>20</sup>. Based on above beneficial ingredients of *Citrullus lanatus* juice like iron which takes part in hemoglobin synthesis, ascorbic acid which facilitates its absorption study was done to check its effects on blood and liver enzymes.

## METHODOLOGY

*Citrullus lanatus* juice was given orally at 2 different doses i.e. 3ml/kg and 6ml/kg respectively<sup>21</sup>. Watermelon (*Citrullus lanatus* var. *lanatus*) brought from local fruit market. Sample was taken when it was present in large amount and available in fresh state for experimental analysis. Fresh watermelon juice prepared on daily basis with the help of muslin cloth.

For long term biochemical effects like hematological and liver function healthy rabbits were used for study. These rabbits were from either gender. Animals were divided into 3 groups their weight ranges from 1200 to 1800 grams.

Group A = control group (Normal saline 6ml/kg).

Group B =Treated group (3 ml/kg).

Group C = Treated group (6ml/kg).

Fresh watermelon juice was administered on two different doses for 60 days. All animals were allowed to acclimatize for period of 1 week under laboratory environment for noticing any lack of activity, edema, hair loss, Diarrhea and ulceration. 7 ml of blood test gathered from rabbits at 7<sup>th</sup>, 30<sup>th</sup> and 60<sup>th</sup> day of study.7 ml sample used for hematological

study and liver enzymes. EDTA K3 tubes were used and filled with 2 ml blood for hematological study. Gel tubes were used for liver enzymes and 5ml of blood were taken in each bottle.

After taking mean of all values they are compared with control group. Significance of mean can be estimated by TUKES POST HOC TEST.  $P < 0.05$  estimated as significant,  $P < 0.01$  estimated as very significant.

$P < 0.001$  estimated as highly significant.

## RESULTS:

The results of one-way ANOVA in complete blood count test showed a significant difference between three groups of rabbits in erythrocyte levels ( $F_{2,6}=39.7$ ,  $P < 0.0001$ ) (Table 1). Tukey's *post-hoc* test indicates that the erythrocyte count was significantly increased in treated groups (CLJ 3 ml/kg and CLJ 6 ml/kg) in comparison with the saline-treated animals (Figure 1).

Animals after 07, 30 and 60 days dosing of *Citrullus lanatus* showed significant rise in Erythrocyte level as correlated with control group. Pre-test count of erythrocytes is 3.8 M/UL while post study count is 5.8 M/UL.

The results of one-way ANOVA, in complete blood count test, showed a significant difference between three groups of rabbits in hemoglobin levels ( $F_{2,6}=153.4$ ,  $P < 0.0001$ ) (Table 2). Tukey's *post-hoc* test indicates that the hemoglobin levels were significantly increased in treated groups (CLJ 3 ml/kg and CLJ 6 ml/kg) in comparison with the saline-treated animals (Figure 2).

Animals after 07, 30 and 60 days dosing of *Citrullus lanatus* showed significant rise in hemoglobin level as correlated with control group. Hb level of pre-test animals was 7.3mg/dl while post study value is 10.8 mg/dl.

The results of one-way ANOVA, in liver function test, show insignificant difference between three groups of rabbits in SGPT levels ( $F_{2,6}=1.899$ ,  $P < 0.2296$ ) (Table 3).

Tukey's *post-hoc* test indicates that the SGPT levels were insignificantly decreased in treated groups (CLJ 3 ml/kg and CLJ 6 ml/kg) when correlate with control group (Figure 3). Pre study level of SGPT was 101 U/L and post study level is 95 U/L.

## DISCUSSION:

Blood is the part of extracellular fluid, it is a specialized type of connective tissue consist of cellular part and plasma. Cellular part comprises of erythrocytes (RBCs), leucocytes (WBCs) and platelets. Most copious cells are red blood cells which contain iron containing red pigment called as hemoglobin (Hb)<sup>[22]</sup>.

Main function of Hb is to deliver oxygen to tissues from lungs it also maintains pH of blood. Juice of *Citrullus lanatus* contains important nutritional components which can increase level of Hb and erythrocytes. Iron present in its juice can

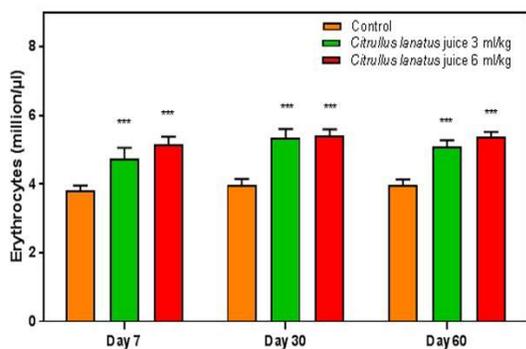


Figure 1: Impact of *Citrullus lanatus* juice on erythrocytes count.

Total Number of animals per bunch (n) = 10.

The perceptions written as mean ± Standard error of mean.

\*\*\*P < 0.001, \*\*P < 0.01, \*P < 0.05; ANOVA took after by Tukey's test

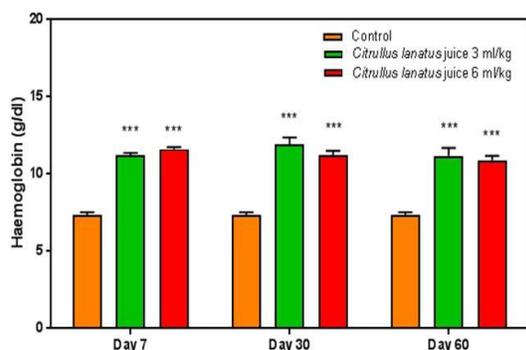


Figure 2: Impact of *Citrullus lanatus* juice on hemoglobin level

Total Number of animals per bunch (n) = 10.

The perceptions written as mean ± Standard error of mean.

\*\*\*P < 0.001, \*\*P < 0.01, \*P < 0.05; ANOVA took after by Tukey's test.

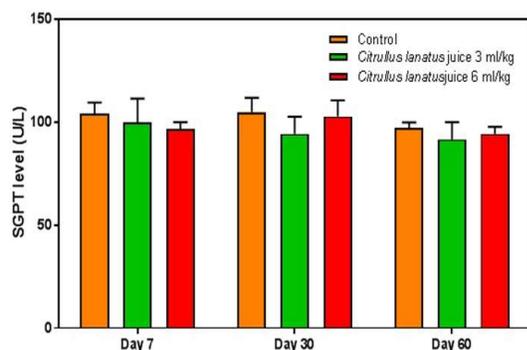


Figure 3: Impact of *Citrullus lanatus* juice on SGPT level

Total Number of animals per bunch (n) = 10.

The perceptions written as mean ± Standard error of mean.

\*\*\*P < 0.001, \*\*P < 0.01, \*P < 0.05; ANOVA took after by Tukey's test.

raise level of Hb and vitamin C which act as anti-oxidant and prevent damage of erythrocytes also facilitate absorption of iron as mentioned above by Shiundu, (2004). It is evident from results that highly significant rise in erythrocytes count and Hb level occur in treated groups compared with control. Pre-test count of erythrocytes is 3.8 M/UL while post study count is 5.8 M/UL. Hb level of pre-test animals was 7.3mg/dl while post study value is 10.8 mg/dl.

Liver is the important vital organ, it perform many biochemical functions. Cells of liver i.e hepatocytes contain many enzymes which perform these biochemical reactions. In acute liver injury enzymes present in hepatocytes release into blood and act as marker of hepatic damage. Aminotransferases are widely used markers for hepatocyte injury. There are 2 types of aminotransferases SGPT also called as ALT (serum glutamic pyruvate transaminase or Alanine Aminotransferase and SGOT or AST (serum Glutamic Oxaloacetic Transaminase or Aspartate Aminotransferase). SGPT enzyme is sufficiently present in liver cells. Its level starts to rise in blood after damage to liver hepatocytes. Rapid rise of SGPT level in blood occur most commonly after acute viral infections<sup>23</sup>. *Citrullus lanatus* juice contains natural anti-oxidants which prevent damage to vital organs from reactive oxygen species. It is evident from results obtained that SGPT level slightly decrease in treated groups as compared to control group. Pre study level of SGPT was 101 U/L and post study level is 95 U/L

Important natural anti-oxidants present in *Citrullus lanatus* are Caretroids, lycopene, vitamin E and beta carotene. These anti-oxidants act as defending role in body and protect different organs from oxidative stress as reported by Pinto *et al.*, (2011). *Citrullus lanatus* also contains alkaloids, flavonoids, steroids and tannins as reported by<sup>[24]</sup>. These tannins, steroids and alkaloids also help in protecting liver from oxidative stress<sup>[25]</sup>. Considering the importance of all these constituents it can be estimated that long term use of *Citrullus lanatus* juice will produce beneficial effects on liver.

### CONCLUSION:

Red blood cells and hemoglobin level markedly increased as compared to control groups, this rise occurs due to its important constituents i.e. iron and ascorbic acid Its juice posses excellent anti-oxidants which have organoprotective role on liver cells evaluated and that liver contains SGPT reduced in healthy animals.

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