



Effect of pomegranate (*Punica granatum*) and garlic (*Allium Stivum*) on liver profile, thyroid hormones, and blood parameters in men

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ABSTRACT

Nature gives us many, many materials that enhance human health and happiness. Fruits and vegetables are considered as a great hidden bank for many food and therapeutic materials as it contains essential mineral, macro and trace elements and other biological micronutrients necessary for, normal metabolism, immunity, and antioxidants of great importance in internal metabolic reactions and may correct adverse conditions, as results of deficiency or various diseases.

This study was designed to investigate the role and effect of a mixture of pomegranate flowers (*punica granatum*) and garlic (*Allium astiva*) flowers as a juice for men. Fifty healthy men, aged between 28-34 years, were given two doses 100 ml each, in the morning and evening, for four weeks.

After the end of the period, the liver profile, antioxidants, kidneys profile, and thyroid gland hormones were measured, in addition to the hematological pictures, and blood pressure. These parameters were including, Alanine transference (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), hematological parameters, creatinine concentration, lipid peroxidation (LPO) by measuring g thiobarbituric reactive substance, malondialdehyde (TBAR) thyroid hormones T3 and T4, high density lipoproteins (HDL), low density lipoproteins, (LDL) and body mass.

The results were impressive in improving the functional performance of each of the liver, kidneys, thyroid gland, blood characteristics and blood pressure, in addition to the antioxidant activities, as the statistical differences between before and after ingestion are highly significant differences ($P < 0.001$)

Keywords:

(pomegranate, garlic, antioxidants, liver profile, kidneys functions, thyroid hormones, blood parameters,

Introduction:

Since ancient times, man has been searching for the best materials for medication. Nature has given a lot to man from its products, whether natural or synthetic, based on natural materials.

The plant, whether cultivated or natural, is the treasure of humanity in this aspect.

Many peoples who have ancient civilizations consider pomegranate to be one of the fruits of paradise, as well, as garlic due to their nutritional and therapeutic benefits.

Pomegranate contains several medicinal and industrial properties because it contains antioxidants, anti-inflammatory and protects the liver. Antioxidant property, anti-inflammatory property and liver protecting property due to the presence of two types of anthocyanins anthocyanins and - pelargonidine which prevent Alzheimer's and attenuates Neuroinflammation Involved in Neurodegenerative Diseases [1].

LihuaZhang, et. al. [2] found two anthocyanins, 3, 5-diglucoside and pelargonidin 3-glucoside from pomegranate flowers. The purified anthocyanins showed strong radical scavenging activities. Pelargonidin 3-glucoside showed higher antioxidant activity.[3]

The garlic (*Allium sativum*) was perennial herb belonged the amaryllidaceous plant families. It was one of the most multipurpose medicinal plant used for food flavoring and traditional herbal medicine for prevented the treatment of broad range for diseases, it contains many active compounds such as alliin and allicin which are active ingredients in various pharmaceutical formulations.[4]

There is scientific evidence that supports garlic and derivatives to treat different conditions such as, asthma, bronchitis, influenza, and colds, and other clinical infections.

Allium savitum herb, contains sulfur compounds such as ajoene, allicin, allyl trisulfide methyl, allicin, allyl methyl trisulfide, cliqualene, diallyl disulfide, dimethyl sulfide, allyl methyl disulfide, allicin, dimethyl thiosulfon, anosine and their derivatives, by enzymatic oxidation, allicin, , allicin, allicin, prostaglandins A, B, E, and F; alkaloids such as phosphatidylcholine, nicotinic acid, diterpene (gibrillin A-3 and A-7); carbohydrates such as allium fructans; Soap: eruposide derivatives, satifocide, and tigonin.[4,5].

Pomegranate (*Punica granatum*) and garlic (*Allium savitum*) have antimicrobial, antioxidant, and anti-inflammatory properties and can decrease the blood pressure. The advantageous properties of pomegranate on

liver and kidney functions have been reported [5-7].

The current study designed to clarify the effect of pomegranate and vine flowers on liver profiles and blood parameters, by setting different criteria.

Liver functions, and blood parameters.

2- Materials and methods

2-1- participants:

Fifty 28-34 years old healthy men were participating, in this study. 100 ml of the experimental supplements, were provided after supper daily for four weeks (28 days). After the end of the experiment, body weight, and body mass index (BMI) were measured according [8], and blood pressure measuring was taken by sphygmomanometers [9]

2-2- Preparation the garlic & Pomegranate flowers juice

Garlic and pomegranate flowers were obtain from local farm in Kirkuk city. Kirkuk is a city located in northeastern Iraq, about 240 km north of Baghdad, at the intersection of latitude 28° 35° north of the equator with longitude 23° 44° east of Greenwich.

Five hundred grams of each garlic and pomegranate flowers, washed with distil water to remove dust and any foreign materials, and blended with 1000ml distill water, and 5gm cloves to give a nice and good flavor, in home blender until completely blended. Then the blended materials sieved by 0.074/mm sieve then the filtrate (juice). The juice was freshly preparing for the experiment whenever needed. Total dry mater of the juice estimated, after dryness of 10ml juice in hot air oven over night at 35o C. The result was 90 mg/ ml.

2-3- Blood collection:

Ten ml blood collection was taking, from median cuboidal and cephalic vein of the right arm divided into two 5ml tubes one of them with EDTA as anticoagulant, the other was left for coagulation at room temperature 22 Co , . After coagulation completed serum was separated by centrifugation, sera was kept in deep freezer at -

25C° until the required examinations are performed.

2-4- Hematological Parameter:

Complete blood count was performed according to slandered methods used for CBC, including packed cell volume(PCV)t using micro-hematocrit centrifuge, white blood cell count,(WBC) and platelets were performed manually using glass hemocytometer type improved Neubauer counting chamber, as described by Marsh, et. al, and Delanghe et.al.[10],

2-5- biochemical examinations:

2-5-1-Estimation of Lipid Peroxidation (LPO): Assessments lipid peroxidation, performed by measuring the thiobarbituric acid reactive (TBAR), express by malondialdehyde formation according to the method described by Buege, and Aust. [11].

2-5-2-Glutathione (GSH) estimation:

Glutathione (GSH) estimation level was performed according to the method described by Ellman [12]

2-5-3- Aspartate aminotransferase (AST) and alanine aminotransferase (ALT)

Assessment of AST and ALT by Randox kits, according to the methods. described by Reitman, and Klein et.al [13, 14]

2 -3-4- -Measurement of Serum concentration of Lipid Profile:

Lipid profile assessment were performed by measuring the cholesterol, high-density lipoprotein (HDL) according to methods described by [15,16] cholesterol, triglycerides levels and low-density lipoprotein level detected according to methods described by (LDL) [17,18]

2-3-5- Estimation level of thyroxin, T4,T3:

Different types of thyroxins (T3 and T4) levels are estimated using ELISA methods described by Abraham [19]

2-3-6- Statistical analysis:

Statistical analysis of the data was performed by an online program, MedCalc Software Ltd. Comparison of means calculator. https://www.medcalc.org/calc/comparison_of_means.php (Version 20.116; accessed October 23, 2022).[20]

Parameters	Before treatment	After treatment	p. value
Body weight (Kg)	95.44±1.122	81.11±0.509	P < 0. 0001
BMI	31.34± 0.163	24.15	P < 0.001
Systolic blood pressure (mmHg)	188.24± 161	111.28± 0.685	P < 0.0001
Diastolic blood pressure (mmHg)	88.45± 0.205	62.61± 0.468	P < 0.0001

3- Results:

Consuming the juice prepared from the flowers of pomegranate (*Punica granatum*) and garlic (*Alliu stiva*) appears to be of great benefit to human health.

The results obtained from this study reveal important values for human health. With highly significant difference in the criteria obtained pre and post administration.

The results arranged according to the criteria for the effect of the juice under this study in relation to its effects on the liver, kidneys, oxidative enzymes, blood parameters, and thyroid hormones.

3-1- body performance

Table (1) showed highly significant decrease in body weight, from 95.44-81.11 kg. Metabolic body index also decreased from 31.34-24.15. Blood pressure systolic and diastolic decreased from 188/111mmHg to 88/62. In that it seem an improvement body performance.

Table :2 Shows the results of liver Alanine transaminase (ALT), Aspartate transaminase (AST), Alkaline phosphatase (ALP). And total glycerides(TG) mmol/l mean \pm standard error and P value before and after administration of *Allium sativa* and *Punica granatum* flowers .

Parameters	Before treatment	After treatment	p. value
ALT (U/l)	39.65 \pm 0.802	11.76 \pm 9.64	p< 0.0001
AST (U/l)	24.89 \pm 0.260	24.261 \pm 0.264	P = 0.927
LDL (mm0l/l)	159.42 \pm 0.459	121.83 \pm 0.550	P < 0.0001
HDL (MM0/L)	38.66 \pm 0.765	59.97 \pm 0.703	P<0.0001
TG (mmol/l)	178.59 \pm 1.163	157.11 \pm 1.246	P<0.0001
Total glyceride mm/l	178.59 \pm 1.163	157 \pm 1.246	P< 0.0001

3-3 - Anti oxidant and kidneys function before and after treatment:

Glutathione, Vitamin E, Vitamin D and Malone di-aldehyde (MDA) are important compounds that play an important role as antioxidants and scavengers of oxidants resulting from internal metabolism in the body. Uric acid and creatinine are result of abnormal or dysfunction of the kidneys and other organs.

Table: 1 Shows, weighs, basal metabolic indexes and blood pressure of the participant before and after administration of *Allium sativa* and *Punica granatum* flowers. Mean \pm standard errors and P value.

3-2- Liver profile and lipid profile

Liver profile by estimation of is important enzymes are important criteria for liver function and blood vesicles status, which include, alanine transaminase (ALT), aspartate aminotransferase (AST) which is an important enzyme indicator to liver, muscles, and other organs damage. Liver profile also includes cholesterol and triglycerides.

Table (2) shows liver profile results, which indicate highly significant improvement of liver functions, by decreased low-density lipoprotein (LDL) (bad cholesterol) and increased high density lipoprotein(LHL) good cholesterol. Total glycerides, and triglycerides (Tg) were highly significant decreased after administration garlic and pomegranate juice.

Table (3) shows the results of the antioxidant compounds (GSH), vitamin E, and vitamin D, which show the moral improvement in (GSH) and reduction in MDA concentration. Vitamins E and D, concentrations are significantly Increased on the revers decrease in uric acid and creatinine, which indicates a significant improvement in the performance of the kidneys and other organs producing them.

Table 3: The effectiveness of pomegranate and garlic flowers on oxidative enzymes and kidney activity

parameters	Before	After	P value
MDA(mmol/l)	81.73±0.226	61.97±0.192	P< 0.0001
GSH(mmol/l)	23.3± 0.764	37.53± 0.051	P< 0.0001
Vitamin E(mmol/l)	17.99± 0.027	19.88± 0.051	P< 0.0001
Vitamin D(mmol/l)	29.26±0.089	37.7± 0.0300	P< 0.0001
Uric acid(mmol/l)	3.42± 0.0636	6.41± 0.622	P< 0.0001
Creatinine(mmol/l)	1.88± 0.78	1.34± 0.44	P< 0.0001
C-reactive protein(mmol/l)	16.21± 0.85	28.13± 0.27	P< 0.0001
T4(mmol/l)	3.4 2± 0.77	2.96 ± 0.73	P< 0.001
T3(mmol/l)	1.86 ±0.11	1.67 ± 0.27	P< 0.001

3-4 - Blood parameters, and glucose results before and after treatment:

Blood parameters reflect the health status of a person, especially with regard to blood cells and the level of blood glucose. Table (4) shows the results obtained before and after administration of the prepared juice from garlic and pomegranate flowers. Results show highly significant differences (P<0.0001), between before and after drinking the prepared juice that mean .in that mild decrease in white blood cells (not significant), increase hematocrits %, hemoglobin, platelets count, neutrophils%,lymphocytes%, and decreased glucose concentration in the blood.

Table 4: Blood parameters, and glucose results before and after treatment (Mean± SE)

Blood parameters	Before treatment	After treatment	P Value
WBC x10 ³ cell/l	9.31 ± 0.177	9.73± 0.022	P= 0.1211
Hematocrits %	33 .4± 0.354	41.4 ± 0.483	P< 00001
Hemoglobin g/dl	12.8 ± 0.298	14.6 ± 0.327	P < 0.0001

Platelets/mm³	245.75±1.066	284.41±1.245	P <0.0001
Neutrophils %	64.11± 1.1554	69.81± 0.2560	P< 0.0001
Lymphocyte %	18.9± 0.525	22.73± 0.279	P< 0.0001
Neutrophil/Lymphocyte	4.37	5.83	P < 0.0001
Glucose(mg/dl)	139.41± 0.564	78.69±.341	P< 0.0001

4- Discussion :

Many people resort to folk medicine away from medicinal chemical therapeutic compounds, and nature has given us many fruits and vegetables that contain effective substances to treat many diseases by strengthening immunity or improving the vital activities of the body. Pomegranate and garlic, for example, have proven nutritional and pharmacological importance, [21, 22] Our current study, as is clear from Table No. (1), showed the importance of pomegranate and garlic flowers in improving the vital parameters of the body for the participants in the study from the side of decreased body weight at the expense of reducing the percentage of fat and thus reducing body weight to the ideal weight, at the expense of reducing fat percentage and thus reducing body weight to the ideal weight, as the pomegranate flowers have an important role in increasing insulin and decreasing Glycated hemoglobin in mice, [23].

With regard to body weight and body mass index, it became clear the effect of pomegranate and garlic flowers on the moral decline of both criteria (body weight and mass criterion), and this is consistent with the results obtained. This decrease in body weight is probably due to the action of allicin, a powerful compound in garlic, which increases the body's metabolic rate by stimulating the adrenal glands to secrete adrenaline which increases the rate of fat metabolism in the body and in turn helps burn more calories and increased weight loss [24.25].

On other side Pomegranate, flower extract improved abnormal dietary fat metabolism of vascular lipids in diabetic mice by activating Peroxisome proliferator-activated receptor (PPAR)-alpha is a ligand-activated transcriptional factor that belongs to the family of nuclear receptors. PPAR-alpha regulates the expression of genes involved in fatty acid beta-oxidation and is a major regulator of energy homeostasis. PPAR-alpha and thus reducing lipid movement and inhibiting vascular uptake,[26].

The results obtained in this study showed significant improvement in the functions of the heart and blood vessels, which was reflected in the improvement systolic and diastolic blood pressure, after taking garlic and pomegranate flowers juice, taking garlic, pomegranate and other parts of its constituent parts (such as flowers and leaves) are rich in antioxidant, antimicrobial, and anticancer properties, including water-soluble tannins and ellagic acid, as well as other compounds (such as anthocyanins and flavonoids) [27]

With regard to pomegranate and flowers, the present study shows highly significant reduction, ALT,AST, MDA,LDL,TG, and triglycerides, in the blood serum, while significant in increase in HDL,GSH, vitamins E and D. These results indicate an improvement of liver functions, and antioxidant properties as well as the kidneys.(Table 2and 3). These results reflect to the components of pomegranate and garlic flowers juice, which have important components in

benefit for many organs metabolism [28], and body health. and for the treatment of many metabolic disorders, as it contains natural sugars and many nutritional elements and compound necessary for the health and safety of the digestive system, heart, blood vessels, brain, nervous system, connective tissues, as well as hormones and many other organs [29].

Concerning hematological picture, the results indicate highly significant improvement in all parameters of the blood in men receiving the juice (table 4) many publications indicated that garlic improved hematological parameters in rat [30], in rabbits [31], in lambs [32] and in human. The same effects were found after pomegranate consumption. The current study showed a slight, non-significant increase in the number of white blood cells and a highly significant increase in the percentages of neutrophils, lymphocytes and blood discs. (Table No. 4) This was reflected in the clear improvement in the general health of the juice drinkers. The results of the packed cells volume and hemoglobin level showed highly significant difference in the benefit of prepared juice drinkers compared to the non-drinkers, and this is due to the activity of the kidneys in the production of erythropoietin and activating factors such as interleukin and interferon, and elimination by excreting uric acid and increasing the reactive protein (Table 3). These variables are in favor of the juice drinkers, and the highly significant decrease in blood sugar, linked to an increase in body metabolism which linked to increase in thyroid hormones T3 and T4 production.[33, 34]

Accumulating data clearly claimed that *Punica granatum L.* (pomegranate) has several health benefits. Pomegranates can help prevent or treat various disease risk factors including high blood pressure, high cholesterol, oxidative stress, hyperglycemia, and inflammatory activities. It is demonstrated that certain components of pomegranate such as polyphenols have potential antioxidant, anti-inflammatory, and garlic flowers anti-carcinogenic effects.[35, 36]

Conclusion

The results of the present work reveal important roles of pomegranate, and garlic flowers in general metabolism of the body. Results showed impressive in improving the functional performance of each of the liver, kidneys, thyroid gland, blood characteristics, blood pressure, and other metabolic processes in addition to the antioxidant activities,

Conflict of interests

The authors declared no competing interests. Compliance with ethical standards.

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