The anti-oxidant effect of processed garlic

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الفعالية المضادة للتأكسد لحبوب الثوم

الخلاصه:

أن الجهد التأكسدي يعتبر سبب لكثير من الأمراض البشريه مثل أمراض جهاز الدوران ، السرطان ،داء السكري وأمراض الجهاز العصبي بسبب تجمع جذور حره للأوكسجين وجذور حره للنتروجين.

أن الثوم استخدم كبهارات وكدواء لمعالجة هذه الأمراض لأ حتوائه على مضادات التأكسد وللتخلص من الجذور الحره الهيدروكسيليه.

الهدف:

دراسة الفعاليه المضاده للتأكسد لحبوب الثوم بواسطة قياس تأثيره على مستوى الكلوتاثايون المختزل(GSH) والميلانالديهايد (MDA)

طريقة العمل:

تم قياس مستوى (GSH)(MDA)ل ١٢عينة دم لأشخاص أصحاء قبل أستخدام الدواء ثم كل ١٠ ايام بعد أستخدامه ولمدة٣٠ يوما

النتائج:

أوضحت النتائج بوجود علاقه معتده احصائيا لمادة MDAوالتي قلت بنسبة ٢٦,٤٢%(P<0.01)بعد شهر من استخدام الدواء.وهناك أيضا علاقه معتده أحصائيا لمادة GSHحيث أرتفعت قيمته بنسبة ٣١,٣%(P<0.01)بعد شهر من استخدام الدواء.

الأستنتاج:

ان لحبوب الثوم فعاليه مضاده للتأكسد وذلك عن طريق تأثيره بزيادة الماده المضاده للتأكسد (الكلوتاثايون) وتقليله لمادة الميلانالديهايد الناتجه من تأكسد الدهون.

Abstract

Background: Oxidative stress is accepted as a critical pathophysiolog mechanism in different human disorder like cardiovascular diseases, cancer , diabetes mellitus and neurodegenerative diseases, because of accumulation of radical oxygen species (ROS) & radical nitrogen species(RNS).Garlic(Allium Sativum) has been used as a spice & as a medicine in treatment of these diseases because it contains antioxidants & regarded as an effective hydroxyl radical scavenger. In the present work the antioxidant effect of processed garlic was studied by measuring its effect on the level of reduced glutathione (GSH) & malondialdyhyde(MDA).

Design of study: Experimental follow up study.

Methods & materials: The level of erythrocyte GSH & plasma MDA were measured in 12 apparently healthy volunteers before & every 10 days for 1month during taking garlic tablets.

Results: The level of GSH was significantly increased by 31.30%(P<0.01)&MDA level was significantly decreased by 26.42% (P<.0.01) after 30 days of ingestion of garlic tablets..

Conclusion: The results suggest that processed garlic has lowering effect on MDA & increasing effect on erythrocytes GSH.

Key words: processed garlic, antioxidant effect

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INTRODUCTION

Oxidative stress is characterized by an imbalance between reactive oxygen species & a biological system ,s ability to detoxify these reactive intermediate. (1)

Oxidative stress is characterized by accumulation of radical oxygen species and radical nitrogen species which are important mediator of cellular structure damage including membrane, proteins and DNA(1). Accordingly oxidative stress had been considered to play an important role in the pathophysiology of different human diseases. (2,3)

Garlic (Allium sativum) is one of the most popular herbs, it has been consumed for flavor ,spice& as important medicine for thousands of years all over the world in treatment of many diseases primarily in cardiovascular diseases ,cancer ,skin problems.(4)It exhibits a wide range of properties including immunomodulatory ,hepatoprotective, antiplatlets, anticoagulant antioxidant, antimutagenic, anticarcinogenic ,hypocholesterolaemic, hypoglycemic& hypotensive activities.(5)

The beneficial effect of garlic can be attributed to the presence of antioxidants such as vitamin c & selenium(6), other phytochemicals such as organosulpher compounds,(allin diallylsulfide,allylsulfide, & propylsulfide,s-allylsulfate, s-allyl cystien, s-ally L cystien& s-allylmercaptocystein)(5&6), its ability for scavenge free radicals,it also inhibits formation of lipid peroxides, enhancement of endogenous cellular antioxidant defenses like GSH(7).

Aim of the study:

The purpose of this work is to study the anti-oxidant effect of commercial (processed) garlic in human being , through the effect of ingestion of garlic tablets on the level of plasma malondialdehyde (MDA) &reduced glutathione in erythrocytes.

Materials & methods:

In the present study the antioxidant effect of processed garlic was determined by studying its effect on the level of GSH & MDA in 12 apparently healthy volunteers(5males & 7 females), their age ranged from30-54 years with mean age of 41.5.

Blood samples were taken from each volunteer to measure the level of GSH &MDA as baseline reading before start taking the garlic tablets ,then at intervals of 10 days for 1month during taking garlic tablets(400mg TDS)

Each garlic tablet contains 400mg garlic powder equal to 2g fresh garlic was given 3 times daily manufactured by COSAR phar. Co.Tehran. Iran. Volunteers were not taking any medicine apart of analgesic & antibiotic capsules for infection.

Determination of MDA:

The thiobarbituric acid assay of Buege & Aust (1978) was used to measure the MDA (9),briefly 2ml of thiobarbituric acid (TBA) solution reagent (a mixture of 0.375% TBA,25%N HCl & 15% TCA) was added to 1ml of serum and mixed thoroughly ,the solution was heated for 15 minutes in a boiling water bath . After cooling, the flocculent precipitate & was removed by centrifugation at 1000pm for 10 minutes.

The absorbance of the sample is determined at 535nm against a blank that contains all the reagents except the serum .The MDA concentration can be calculated using an extinction coefficient of (1.56X 105µ-1cm-1)

MDA=(ΔA/1.56)χ10 µ mole/l

Determination of GSH

GSH level was determined by the method described by (Beutler & Balueta,1963) The 5,5 dithiobis-(2- nitrobenzoic acid DTNB) can be reduced by sulfahydryl compounds , to yield intensely yellow compound & the absorbance of the reduced chromogen is measured at 412 nm(10).

GSH standard: GSH standard solution was prepared as 100mgGSH/ dl distilled water, then different concentrations were prepared from the standard as 5,10,15,20,30,40,& 50mg/dl by dilution to establish a standard curve, as shown in figure (1)

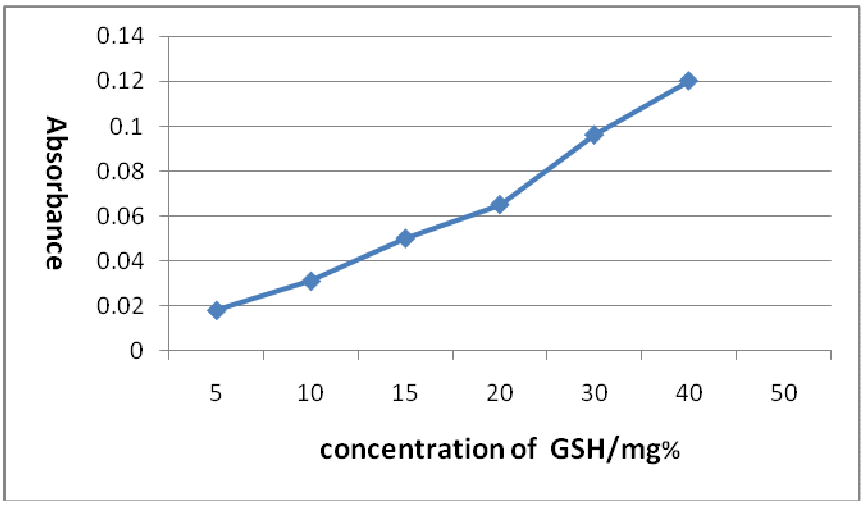

Fig.(1) GSH standard curve

Packed cell volume (hematocrit) was determined by the method described by Daice 1984,(11)using(OHIO Hematocrit centrifuge)

The GSH concentration can be obtained by using the following equation:

GSH mg/dl of erythrocytes= (GSH concentration from the standard curve / hematocrit) χ100

Statistical analysis :Differences in the level of GSH &MDA before &every 10 days for one month of taking garlic tablets were expressed as mean ±S.D & comparison of mean relative changes were made with paired T test &P≤ 0.05 was considered statistically significant.

Results:

The mean ±S.D Of MDA & GSH were shown in table(1) at base line& on day 10,20& 30 after ingestion of garlic tablets.

There were statistically significant decrease in the mean of MDA on day 10,20,30 in comparison with base line values($P<0.05$),figure(1).

Regarding the effect of garlic on GSH, the results show a significant increase in the mean of GSH on day 10,20,30 after ingestion of garlic tablets in comparison with the base line($P<0.05$), figure(2).

Table (1) The level of GSH & MDA before & after ingestion of garlic tablets.

parameters	Before ingestion of garlic (mean±SD)n=12	After 10 days of ingestion of garlic(mean±SD)n=12	After20 days of ingestion of garlic(mean±SD N=12	After 30 days of ingestion of garlic (mean±SD) N=12
MDAμmol/l	1.06±0.16	0.99±0.12*	0.87±0.13*	0.78±0.09*
GSHmg/dl	75.11±13.9	80.73±9.55*	87.08±12.92*	98.64±16.68*

*Statistically significant difference from respective baseline values.

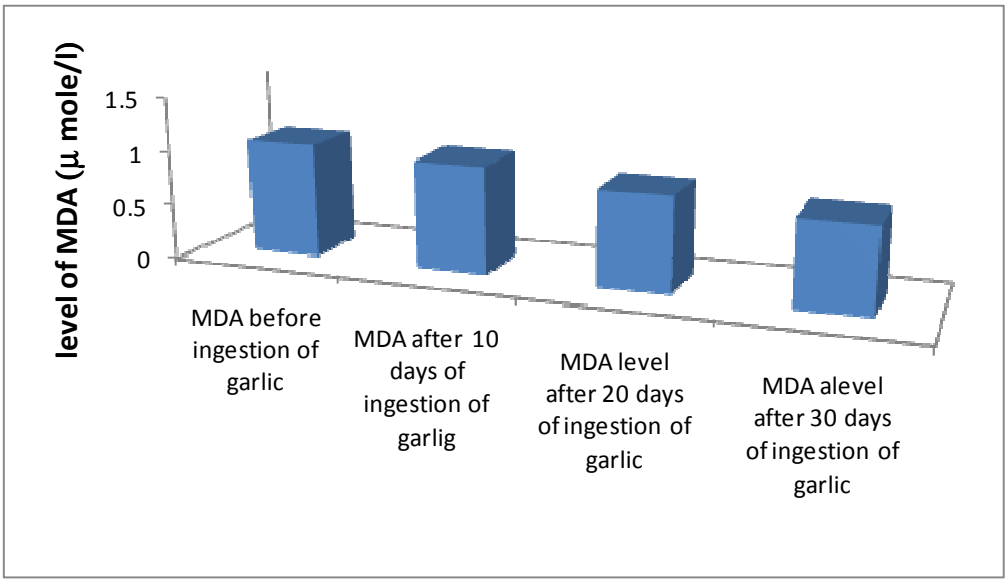

Figure (2) .The effect of garlic on MDA level

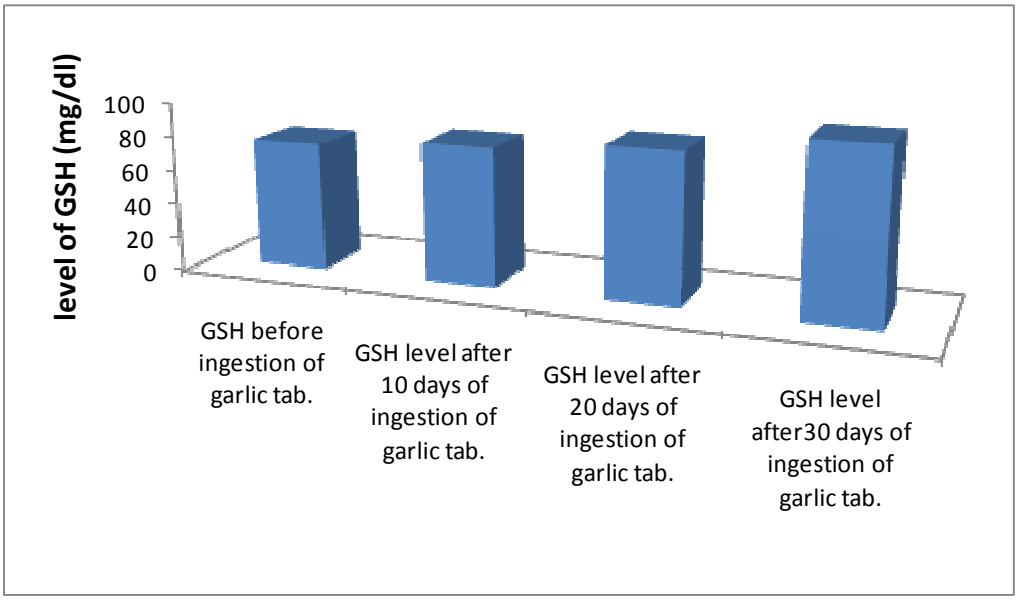

Figure (3) The effect of garlic on GSH level

Discussion:

The results showed that the preparation of garlic was significantly decrease plasma MDA level & this effect started 10 days after ingestion of the drug and increased progressively during the following 20 days of ingestion as shown in table (1) ($P<0.05$)This result is in agreement with the results of Aslihan Avci(2008) who studied the effect of ingested garlic tablets (0.1g/kg b.w) on plasma & erythrocytes antioxidant parameters of elderly subject,& the results showed that MDA is signifigantly decreased after ingestion of the drug(12).

It was also reported that MDA is decrease in patients with transplanted kidney after using garlic by swallowing rout. (13)

As MDA is important marker of lipid peroxidation (14) which can be decreased by antioxidant consumption(5), so garlic tablets could be useful in preventing diseases results from lipid peroxidation or at least in preventing their complications, like atherosclerosis ,cardiovascular & cerebrovascular diseases. In addition end products of lipid peroxidation may be mutagenic & carcinogenic through damaging of proteins & DNA(15)

The results also showed that the preparation of garlic lead to significant increase in the level of erythrocytes glutathione (GSH) & the effect started 10 days after ingestion of garlic tablets then increased progressively during the following 20 days as shown in table (1) ($P<0.05$).

It was reported that garlic oil (GO), diallyl sulfide, diallyldisulfide & diallyltrisulfide were significantly increased GSH contents(48%-80%)in RBCs of the rate.(16).

As glutathione is an important defense mechanism in living cells , as substrate for the antioxidant enzyme glutathione peroxidase, also protects cellular constituents from the damaging effects of peroxides & protects the RBCs from hemolysis, so decreased tissue GSH levels are associated with cell damage,depressed immunity, progression of aging & may increase the risk of cancer development(8).

As glutathione is a potent antioxidant & detoxifier, so garlic can be used in preventing ROS – induced DNA, lipid & protein damage responsible in the diseases & aging processes.

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