The Effects of Hydroalcoholic Extract of Garlic on Serum NO Level in Male Rats

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Abstract—Although there are ample reports indicating the effects of garlic on various body systems, few information is available about the effects of garlic on NO system. The purpose of this study was to determine the effects of hydro alcoholic extract of garlic on serum levels of NO in male rats. In this study, male Wistar rats were randomly divided into control, normal saline receiving, garlic extract (100 mg/kg/body weight) receiving animals of 5 rats in each group. Garlic extract was daily injected intraperitonealy for 7 days. Blood samples were collected using cardiac puncture method serum NO level was measured using spectrophotometry method. Data were statistically analyzed and compared between groups using ANOVA. Serum NO level was not significantly changed in normal saline receiving rats compared with control animals, however, serum NO level was significantly increased in garlic extract receiving animals compared to control rats.

Keyword— Garlic, NO, Rat.

I. INTRODUCTION

Nitric oxide (NO) is an important messenger molecule involved in many pathological processes within the mammalian body. This molecule has become in the past few years one of the more studied entities in biological chemistry. It has also been implicated as mediator in a variety of physiological functions, including neurotransmission, platelet aggregation, macrophage function, and vasodilation. [1]-[4]. Pathophysiological role of nitric oxide in the heart and the coronary vasculature has been reported [5].

Garlic is widely recognized for its immense therapeutic potential. Garlic has been shown to exert its beneficial effects against a wide spectrum of diseases, including cancer, diabetes, and microbial infections, as well as immunological and cardiovascular disorders. Most of the research on garlic has indicated that garlic and its active compounds are effective in reducing cardiovascular and metabolic risk by normalizing abnormal plasma lipids, oxidized low density lipoproteins, abnormal platelet aggregation, high blood pressure, and cardiac injury [6]. It has also been shown that garlic consumption might serve as protective factors on lung cancer [7].

Despite studies in connection with the effects of garlic extract on many aspects of biochemical and physiological functions of human body, there are few report on the effects of garlic on NO concentration in serum or tissues. In this regard, this study was exerted to determine the effects of garlic extract on serum levels of NO in male rats.

II. MATERIAL AND METHODS

A. Study Population

Adult male Wistar rats weighting 190±10 grams were purchased and raised in our colony from an original stock of Pasteur institute(Tehran, Iran). The temperature was at 20-25°C and animals kept under a schedule of 12h light:12h darkness (light on at: 8:00 a.m.) with free access to water and standard laboratory chow. Care taken to examine the animals 12-14h before operation or death. In all experiments, attention was paid to the regulation of local authorities for handling laboratory animals and the Ethical Guidelines for investigation of immobilization stress in rats.

B. Protocol of Study

In this study, male Wistar rats were randomly divided into control, normal saline receiving, garlic extract (100 mg/kg/body weight) receiving animals of 5 rats in each group. Garlic extract was daily injected intraperitonealy for 7 days. Blood samples were collected using cardiac puncture method. Following serum collection, serum NO levels were measured by spectrophotometery method.

C. Statistical Analysis

All results are presented as mean±SD. The significance of differences between groups was determined by student’s t and Chi-square test. The SPSS software (version 11) was used for all computer analyses. The differences were significant when α<0.01.

III. RESULTS

Table I indicates serum NO level in control and normal saline or garlic extract receiving male Wistar rats.

| Table I: Serum NO Level (μM) in Control and Experimental Groups |
|-----------------|-----------------|-----------------|-----------------|
| Control         | Normal Saline   | Garlic Extract  |
| No              | No              | No              |
| Serum NO Level  | Serum NO Level  | Serum NO Level  |
| 1.5±0.2         | 1.7±0.1         | 2.0±0.3         |

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TABLE I
NO LEVEL IN CONTROL AND NORMAL SALINE OR GARLIC EXTRACT RECEIVING MALE WISTAR RATS. DATA REPRESENT THE MEAN±SD OF 5 RATS.

<table>
<thead>
<tr>
<th>Groups</th>
<th>NO (µmol/L)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>55.28±2.62</td>
<td></td>
</tr>
<tr>
<td>Normal saline receiving</td>
<td>56.28±2.02</td>
<td>NS</td>
</tr>
<tr>
<td>Garlic extract receiving</td>
<td>83.91±10.71</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Data represent the mean±SD. P values are versus control. NS indicate non-significant difference.

IV. DISCUSSION

According to our study, garlic extract can increase serum levels of NO in male rats. It has been shown that garlic plays a pivotal role in platelet physiology [8], [9]. Since some aspects of platelets function is related to NO, the effects of garlic on blood NO concentration is conceivable. Garlic extract contain ingredients such as allicin which has pharmaceutical importance [10] and affects on pulmonary blood [11]. The reports also indicate that allicin in garlic extract is vasodilator and a potent inhibitor of angiotensin II [12], [13]. As vasodilatation is directly related to NO levels, it can be suggested that garlic extract effect on physiological systems is partly mediated by changes in serum NO level that we have shown in our study.

V. CONCLUSION

As administration of garlic extract plays a significant role in increasing of serum NO levels, it is most likely to consider that some effects of garlic on body physiology or chemistry is mediated by changes in serum NO level.

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REFERENCES