Evaluation of The Effect of Garlic and Onion on Platelet Aggregation and Coagulation Activity

THESIS

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بسم الله الرحمن الرحيم

قالوا سبحانك لا علم لنا الا ما علمتنا
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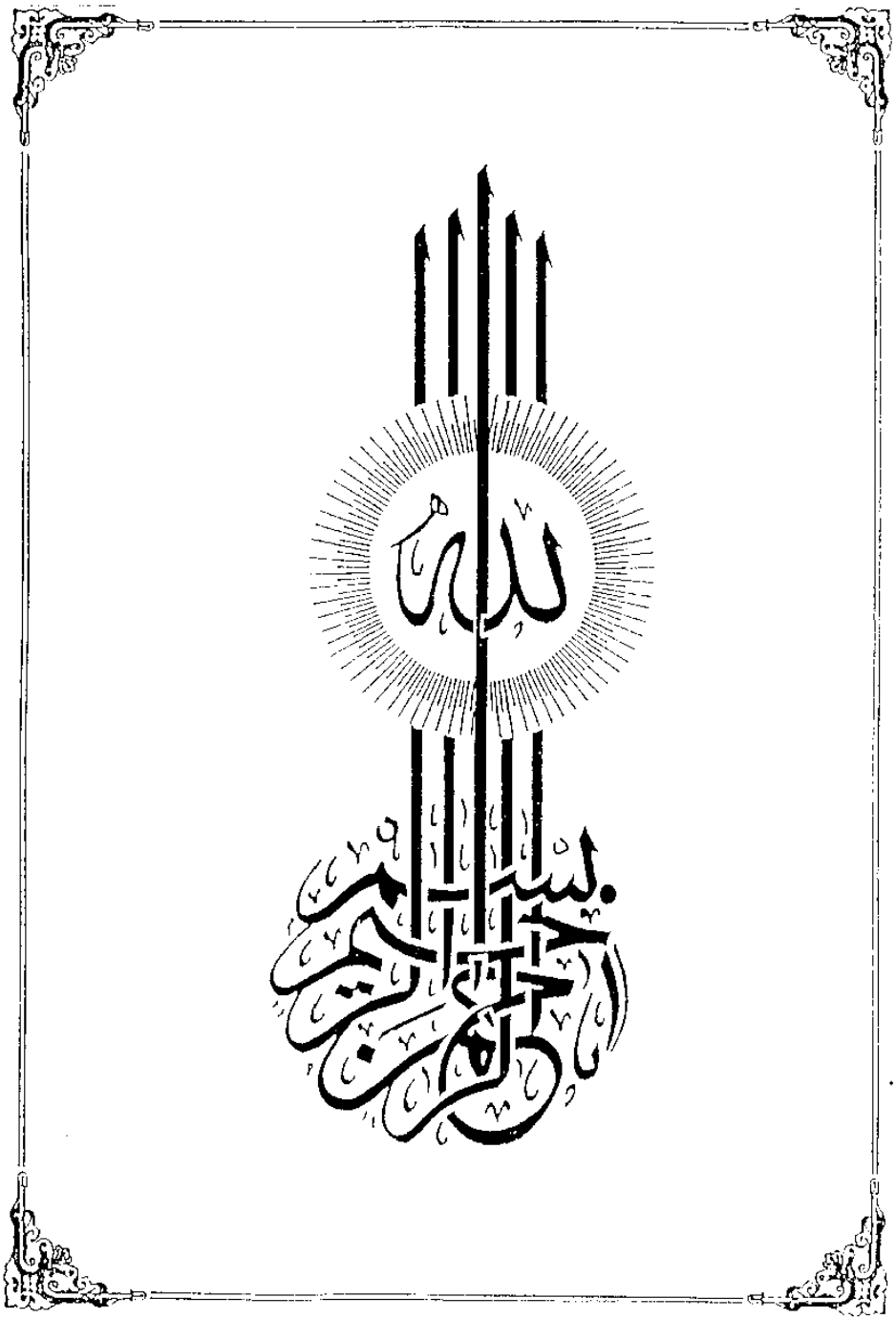
صدق الله العظيم



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INTRODUCTION
&
AIM OF THE WORK

The family liliaceae contains about 500 species of which Allium is a genus of these species .

Only a few of them are of importance as food plants like Allium sativum (garlic) , Allium cepa (onion) , Allium Kurratum (Kurrat) and Allium porrum . These plants have been used many centuries ago for their flavour , characteristic taste , medical properties and in some parts of the world for relegious aspects .

The characteristic odour and flavour is derived enzymatically from involatile precursors of higher molecular weight precursors which lack this flavour and odour (Fenwick and Hanley, 1985).

In Egypt many Allium species are cultivated :

i- Allium sativum (garlic) .

ii- Alium cepa (onion) .

iii- Allium kurratum (Kurrat).

vi- Allium porum

Allium sativum (garlic)

Garlic is the fresh bulb of A. sativum cultivated widely in Egypt and mainly used as a condiment . The bulb is subglobular 4 - 6 cm in bridth and it is composed of 8 - 15 bulbils (cloves) surrounded by whitish scales or membranes .

It has disagreable odour and intense pungent taste .

Chemical composition of A. sativum :

Semmler in (1892) obtained a strong smelling oil from garlic bulbs by steam distillation . He fractioned this oil into a number of pure compounds which were identified as diallyl polysulphide and a little disulphide .

Rundquist in (1909) isolated the basic principle present in garlic from which diallyl sulphide was obtained by enzymatic cleavage and he called that compound "alliin " .

Cavallito and Baily (1944) isolated a substance from ground garlic and call it allicin .

Atal and Co- workers (1961) investigated the indian garlics by thin layer chromatography for its amino acid content . They found that the aminoacids were alanine , arginine , aspartic acid , aspargine , histidine , lucine , methionine phenylalanine and others .

Carban et al (1962) reported the chemical composition of garlic as follows :
bulbs contain 7 - 9 mg % vitamin C when fresh , 9 % sugar , 3 % inulin and 37 - 43 % dry substance .

In 1976 Nitscke and others separated saponins from garlic by thin layer chromatography using silica gel .

Lipid content of garlic was studied in 1980 by Kamanna and Chandrasekhara , they used the technique of column chromatography using sephadex and silicic acid . They concluded that the total lipid content was ranging from 0.5 - 0.6 % according to the method of extraction . Fractionation of the total lipid was as follows : 62.6 % neutral lipid , 14.0 % glycolipids and 23.4 % phospholipids the unsaturated fatty acids was 72 - 80 % among them linoleic acid predominates .

In 1964 Pant and others identified the presence of gulcose , fructose , lactose , sucrose and raffinose by the technique of paper chromatography .
They also reported that garlic contains about 10.75 % carbohydrate.

Volatile oils of garlic can be obtained by steam distillation of garlic bulbs or by extraction method .

A) <u>Steam distillation :(Meek and Salvim , 1937) :</u>

Garlic bulbs were minced and left in the distillation vessel with water for 24 hours before distillation . Steam distillation is continued for 5 hours and volatile oil was obtained by saturating the turbid milky distillate with sodium chloride and extracting it by ether . Anhydrous sodium sulphate is used to dehydrate the ether extract and ether was evaporated under reduced pressure .

Virtanen and Matikkala (1959) isolated cycloalliin which is an aminoacid obtained from onion by alcohol extraction .

In Egypt Abdel- Bar (1968) estimated the free amino acids in the bulb of onion " Guiza 6 " to be cystine , cysteine , lysine , aspartate , glutamate , alanine and others .

Another Egyptian study to yeild onion volatile oils in the faculty of pharmacy was carried out using steam distillation and ether extraction .

The study used Giuza 6 and El Beheri types and the oil content was about 0.02 % by steam distillation and 0.2 % by ether extraction .

dical benefits of Garlic and Onion :

Garlic (Allium Sativum) and onion (Allium Cepa) can be garded as the most famous plants widely used many centuries ago many parts of the world (Robbins , 1924) . Ancient indians and ineese employ these two plants for the treatment of many seases .

Arab also studied them for their flavour and medical properties. n - Sina in his famous text - book " El - Kanoun Fi Alteb " scribed the benefits of onion and garlic in treating medical oblems . Ibn - Sina mentioned onion benefits in skin diseases ke Vetiligo, alopecia and warts especially when mixed with salt. e use of onion in ear diseases was also recommended by Ibn - na especially for tennitus and discharging ears .

Also onion was described mixed with honey for treating thmatic patients , wounds due to rabid dogs and constipation .

The value of garlic as a medical plant was mentioned by Ibn - na . He described garlic in treating sciatica , toothache and ugh . The decoction of garlic leaves was used by Ibn - Sina as a uretic and in treating snake bite .

Hippocrates in his book " De vita acutorum " described the le of A. sativum (garlic) as a diuretic and wound antiseptic .

Discorides recommended the use of garlic as a vermifuge and for the treatment of skin rashes , snake bites and leprosy .

Platelet Structure

rphology :

In peripheral blood , platelets are heterogenous as gards size , density and staining characters .

The morphology of platelets differs widely depending on ie method used for visualization , the anticoagulant used id the temperature (Girwirtz , 1981) . They circulate as ariable sized disc shaped bodies measuring 3.6 ± 0.7 um in iameter , 0.9 ± 0.3 in thickness and 7.0 ± 4.8 fl in volume id the mean surface area was 22.2 um^3 (Frojmovie, 1976) . n a peripheral blood film stained with Romanowsky stain latelets appear as small formed entities while under the lectron microscope they are found to be irregular and their ater surface shows many identations (Hoving 1968) . latelets when examined under the dark field illumination ppear translucent with sharp contour , and have few immobile canules in the cell centre (Maupin 1969) .

ltra structure of platelets :

Electron microscopic studies show that platelet can be ivided into several zones :

eripheral zone , sol gel zone organell zone and membrane ystem (Vermylen et al , 1983) .

. Peripheral zone :(Marshall , 1983)

It is composed of a double layer of phospholipid in which

glycolipids , cholestorol and proteins are embeded . Some of the phospholipid are negatively charged and they are distributed mainly on the inner surface of platelet membrane. The outer coat extends 150 - 200 A° from the phospholipid layer .

This layer is composed of several constituents like carbohydrate rich- protein , glycolipids , mucopolysaccharids and plasma proteins adsorped to the platelet surface .

This membrane mediates the platelet - environment interaction and has a central position in platelet physiology (Zucker, 1977) .

2. Sol Gel zone :(Martha , 1983) .

This is composed of the platelet cytoskeleton which maintains the resting disc shape , the explosive shape changes and in which the organelles are embeded . This zone includes :

A- Contractile Proteins :

Actin is the most abundant platelet protein . It represents 20 % of the platelet protein . It is composed of a mixture of two single chain protein of molecular weight 44,000 that are similar to but not identical with muscle actin .

Myosin is composed of 6 polypeptide chains and although it is analogous to skeletal muscle myosin , it differs immunologically . All the six chains are contractile to the dimeric head region (Booyse and Rafelson , 1971) .

B- Platelet Microtubules :

Composed of two major proteins of 55,000 molecular weight in association with several high molecular weight protein called tubulin (White 1968) .

This is a ring like structure which may be a single microtubule surrounding the platelet several times before terminating into two free ends .

C- The Microfilaments :(Kaplan , 1979)

They are responsible for contractile mechanism of the platelet . Each measures about 50 A° in diameter . Both microfilaments and microtubuls induce waves of contractions during the discharge of platelet contents after stimulation .

3. <u>The organelle zone :</u>

A big number of organelles and particulate elements are embeded in the sol gel matrix . They show random distribution and become centralized in response to activation . These include platelet granules , dense bodies , mitochondria and Golgi apparatus .