

## AN EFFICACY OF ZANJABEEL (ZINGIBER OFFICINALE ROSCOE) IN THE MANAGEMENT OF DYSLIPIDEMIA/ HYPERLIPIDAEMIA: A REVIEW

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### ABSTRACT

The tradition of home treatment is found in all cultures throughout the world whether in developed or developing countries. Few herbal drugs commonly appear in the home use as a medicine. One such drug is *Zanjabeel*, it is the rhizome of *Zingiber officinale* Rosc. It is a popular spice that was used as an important medicine by ancient Unani physicians. It is a very important drug of house hold medicine kit used mainly as antifatulent, digestive, anti-cough and other indications mentioned in traditional Unani text. Beside its traditional uses its new indications are as an, anti-emetic, hypocholesterolaemic, antioxidant, antimicrobial, cardioprotective etc. Unani medicine has provided lot of information regarding this drug. Fresh look on the indications of *Zanjabeel* is needed in the light of current research performed on it and further scope of research can also be explored with the help of traditional knowledge exist in Unani medicine. This review is an attempt in this direction, so that *Zanjabeel* can become more beneficial to ailing people and particularly in contemporary lifestyle diseases which is an emerging concern. In Unani System of Medicine, many drugs (single drugs as well compound formulations) are used for the purpose of reducing body weight and treating the obesity (*Muhazzil*). Indian gooseberry (amla) & ginger (*Zanjabeel*) are among these medicines. Since these drugs are useful in obesity, these can also be proved beneficial in lowering increased concentration of plasma lipids or treating hyperlipidaemia. Their efficacy has also been proved pharmacologically and these are documented as good hypolipidaemic as well as antioxidant natural agents. The combination of drugs was found to be significant in lowering the level of serum total cholesterol, serum triglycerides, serum LDL-cholesterol, serum VLDL-cholesterol and in increasing the level of serum HDL-cholesterol in patients of primary dyslipidaemia/hyperlipidaemia.

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### INTRODUCTION

*Fart-e-Tadassum Fil-dam* is not described as such in Unani literature, in fact it is literally termed as Hyperlipidaemia/dyslipidaemia.<sup>1</sup> but when we trace back the history, we find that this disease is described in detail in Unani literature with the name "*Saman-e-Mufrit*" which exhibits similar features as *Fart-e-Tadassum Fil-dam*. because in that time the facility of biochemical analysis of blood was not available. But most of the famous Unani scholars have described the

condition obesity under the term "*saman-e-mufrit*" which is very similar to the disease dyslipidaemia/hyperlipidaemia in its etiology, clinical feature, complication and management. Therefore, we can obtain valuable benefits in regard to dyslipidaemia/hyperlipidaemia by the clinical experiences and observations of these great scholars. It is a well-established fact that *Fart-e-Tadassum Fil-dam* (Hyperlipidaemia) has directly linked with atherosclerosis and ischemic Heart disease.

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*Fart-e-Tadassum Fil-dam* is a major public health problem throughout the world and is characterized by increased lipid in blood due to either increase in rate of synthesis or decrease in rate of breakdown of lipoproteins.<sup>2</sup>

The word, hyperlipidaemia/dyslipidaemia literally means high level of lipid (fat) in the blood. Hyperlipidaemia/dyslipidaemia is defined as; raise in plasma Cholesterol, Triglyceride or both. Hyperlipoproteinemia is a more specific term instead of dyslipidaemia/hyperlipidaemia which means higher than normal amounts of one or more of the lipoproteins which transport lipids in blood, because most dyslipidaemia/hyperlipidaemia (i.e., increased serum cholesterol and/or triglyceride level) are accompanied by an elevation in one or more lipoprotein fraction and in reality, are hyperlipoproteinaemias.<sup>3,4</sup>

It is a metabolic disorder in which a group of disorder characterized by an excess of lipids of fatty substances such as cholesterol, triglyceride and lipoprotein in the blood. Hyperlipidaemia is common condition which may either result from Primary abnormality in lipid metabolism or is a secondary manifestation of some other condition. Dyslipidaemia/Hyperlipidaemia is major cause of increased atherogenic risk, and both genetic disorders and diet enriched in saturated fat and cholesterol contribute to the elevated lipid levels of our population and many other develop countries around the world.<sup>5</sup>

The factors which affect the concentration of various plasma lipoprotein are lifestyle or behavioral (e.g. diet, exercise), genetic e.g. Mutation in a gene regulating lipoproteins level or metabolic conditions.<sup>5</sup>

### Historical Background:

Ginger has been known for centuries as a culinary spice and medicinal plant all over the world, and is used even more today.<sup>6</sup>

Zanjabeel is a well acquainted and widely used condiment and medicine. It is the dried rhizome of a plant - *Zingiber officinale Roscoe* belongs to the family Zingiberaceae, order musales<sup>7</sup>

Zingiber is evidently derived from the Persian shingabir or from Arabic name, Zanjabeel, most probably Arabic and Persian names have same origin i.e. Shringavera in Sanskrit.<sup>7</sup> Ginger appears to have been used as a spice and a medicine from earliest times by the Chinese and Indians. There being numerous references in Chinese treases and in Sanskrit literature.<sup>8</sup>

The drug was known to the Greeks and Romans, who appear to receive it from India by the way of red sea and considered it to be a product of southern Arabia.<sup>8,9</sup> Ginger was also known to Europeans as it was an important item in European commerce with the east, during the middle Ages. It was introduced into Jamaica and other Islands of West Indies to Spain even during the year 1547 A.D.<sup>9,10</sup> Zanjabeel occupied a considerable place not only in Ayurvedic literature and Unani Pharmacopoeias but also included in the British pharmacopoeias, Indian Pharmacopoeias etc.<sup>8</sup>

### Synonyms:-

- Arabic - Zanjabeel, Zanjabeel -e-Yabis, Zanjabeel Qafeer
- English - Ginger
- Latin - Zingiber, Gingiber
- Persian - Shangabir, Zanjabeel-e-khushk, Zangbir
- Greek - Hatyoon
- Hindi - Adrak, Sonth
- Sanskrit - Sinthela, Maha-aushadhi, Vishva-bheshjam, Shringavera
- Chinese - Ganjiang (Dry ginger).<sup>11, 12,13,14,7,8.</sup>

### Habit & Habitat

The plant originated in the tropical jungle of Asia, where it still holds prominence as an important food and medicine e.g. Indonesia, Thailand, and Vietnam etc. At present it is cultivated in all the warmer regions of whole world notably in West Indies, India, Nigeria, West Africa<sup>15,12,16</sup>, Japan<sup>16</sup>, Oman<sup>11</sup>, and Yaman.<sup>12</sup> Though some suggest that nativity of Zanjabeel is unknown.<sup>9</sup>

Zanjabeel does not occur in a truly wild state.<sup>17, 12</sup> it is Cultivated in all the warmer and Moist parts of India i.e. Madras Cochin, Travancore and to a lesser extent in Punjab.<sup>7, 18</sup> Other important ginger growing states are Orissa, Karnataka, Madhya Pradesh & Himachal Pradesh.<sup>19</sup> It is also found up to an elevation Of 4000-5000 feet in the Himalaya.

### Cultivation

For the cultivation of zanjabeel, the soil should be a well drained rich loam and the climate must possess an abundant rain fall of about 18 inches/year and in its absence irrigation is necessary.<sup>20,21,16</sup>. As the plant is sterile it is grown by vegetative means, pieces of rhizome, each bearing a bud are planted in holes or trenches during March and April.<sup>16,21</sup> and the rhizomes are ready to dug in the following January and February.<sup>20</sup>

### Forms and varieties of Zanjabeel

The dried rhizome called zanjabeel is known into two forms mainly, the rhizome with its epidermis, which are called uncoated or scrapped.<sup>15,17,16,18</sup> Several varieties of ginger are recognized by pharmacologists according to the country of origins those commonly found in British commerce are Jamaica, Cochin and Bengal; while Cochin and Bengal gingers are scrapped, African ginger is a un-scrapped ginger, Jamaican variety is scrapped and unbleached.<sup>15</sup>

**Morphology in Unani Literature:** Zanjabeel is a rhizome of herb.<sup>11, 22,18,12, 23, and 14</sup>. The plant of zanjabeel resembles with the plant of Shaqaqul (*Tracydium lehmauniBenth*) and it bears neither flower nor fruits.<sup>22,18</sup> leaves are thin and longitudinal. The length of leaves is about a hand palm.<sup>11</sup> Rhizome is small, whitish and nodular in appearance. It has a sharp taste like Filfil siyah (*Piper nigrum* Linn.) and possesses Characteristic odour.<sup>18, 12</sup> though zanjabeel is frequently cultivated in various parts of the world, the Unani physicians described its two varieties- one is cultivated and other grown widely.<sup>24,25</sup> it is also described that better ginger is the one which comes from China.

### In Ethno botanical Literature

The plant of ginger is a perennial rhizome, consisting of a series of many Persistent roundish joints.<sup>15,16</sup>

### Stem

Erect, leafy, 0.6-1.2 meters in height, entirely covered with leafy stem.<sup>15,19,14</sup>

### Leaves

Narrow, alternate, distichous, sub-sessile on the sheath, linear lanceolate, 1-2 cm. wide and glabrous, sheaths long, terminating in to two small rounded auricles.<sup>19,14</sup>

### Flowers

Greenish with a small dark purple lip in radical spikes 3.8-7.5 cm. long and 2.5 cm. in diameter or purplish black lip, stamens dark purple, rather shorter than the corolla.<sup>19</sup> styles passing up behind and between the anthers cells, stigma tufted.<sup>15,14</sup>

### Fruits

Not seen.<sup>15</sup>

### Description of rhizome

#### Macroscopy

Rhizome of ginger is horizontal with sympodial branching 5-15 cm. in length and 3-6 Cm. in breadth, thickness is 0.5-1.5 Cm. surface is longitudinally striated

and buff color with occasional projecting fibers.<sup>16,21</sup> it gives an agreeable, aromatic and penetrating odour and has acrid, pungent taste.<sup>16,20,21</sup>

**Microscopy-** Outer zone of cork consists of irregularly arranged cells, while the cells of the inner zone are radially arranged. Phellogen is indistinct and cortex comprises of thin walled, rounded parenchymatous cells contain oleoresin. Closed collateral fibro vascular bundles are also present in cortex. Epidermis is distinct and below the epidermis there is a ring of vascular bundles without fibers.<sup>16</sup>

### Mizaj (Temperament):-

Hot 3 Dry 2<sup>13,12,24,18</sup>

Hot 3 Dry 1<sup>26,22,23</sup>

Parts Used:-

Dried rhizome<sup>11,15,7</sup>

### Dosage:-

Powder: 1-2 Gms.

Infusion: 7-20 ml.<sup>27</sup>

### Chemical Constituents

Climatic and agricultural conditions have a pronounced effect on the chemical constituents of ginger quantitatively but its qualitative values almost remain the same. Ginger chiefly constitutes starch, volatile oil, oleoresins.<sup>15,7,16,20,19,8,21</sup> The characteristic pleasant aromatic odour of ginger is due to an essential oil which is 2.5-3.0 % quantitatively and contains sesquiterpens hydrocarbons, sesquiterpens alcohols, monoterpenoid esters of acids and a traces of phenol<sup>9,8</sup> among them predominant are Zingiberine 35.6%, ar-curcumene 17.7%, farnesene 9.8%, zingiberol and b-pinene, cumene, myrcene, limonene, p-cymene, camphene and b-phellanderene and associated compounds Are 2-Heptanol, n-nonanol, n-decanol, methyl heptone, geraniol, 1, 8 - cineole, borneol and citrol etc.<sup>16, 8,21</sup> the drug owes its pungency to a non-volatile oleoresin, which is dark brown in colour. It consists of gigerol, shogaol and zingerone.<sup>9,28</sup> besides volatile oil and oleoresin ginger also contains carbohydrates mainly starch, proteins as albumin, globulin, free amino acids as glutamic acid, aspartic acid, serine, glycine, g-amino butyric acid and some minerals e.g. Ca, P and Fe.<sup>29</sup>

### MEDICINAL AND

### PHARMACOLOGICAL ACTIVITIES

#### Hyperlipidemic activity

An ethanolic extract of ginger reduced hyperlipidaemia induced by an atherogenic diet. A Reduction in the levels of serum and total cholesterol, Sr. triglycerides and phospholipids and an increased coagulation time, were

observed when compared with the control groups. The extract of ginger was comparable to gemfibrozil<sup>27,30,31</sup>

#### **Cardiovascular activity**

Ginger decreased Serum and hepatic cholesterol and inhibited biosynthesis levels in cholesterol fed rats.<sup>27,31</sup> It also stimulated bile acid biosynthesis from cholesterol.<sup>27</sup>

#### **Antioxidant activity**

The pungent principals, including gingerol 99, and zingerone 100 in vitro demonstrated their effects in scavenging the superoxide and hydroxyl radicals 101 in vitro and Inhibiting lipid peroxidation.<sup>27,30,31</sup>

#### **Antiemetic activity**

Ginger was found to be superior to dimenhydrinate in preventing motion sickness and the Gingerol and shogaols were identified as the main antiemetic principals. Studies suggest that, the action of ginger modulated vestibular impulses to the autonomic centers of the central nervous system. In a study of 30 pregnant women, in a double blind randomized cross over trial, it was observed that powdered root ginger was superior to placebo in reducing the symptoms of hyper emesis gravidarum (morning sickness).<sup>27,32,31</sup>

#### **Antihepatotoxic activity**

Protection by the gingerols and shogaols against carbon tetrachloride and galactosamine induced toxicity was observed in cultured rat hepatocytes.<sup>27,31</sup>

#### **Anti-inflammatory activity**

An ethanolic extract of the rhizome reduced carrageenan induced paw swelling and yeast induced fever in rats, but was ineffective in suppressing the writhing induced by acetic acid. The essential oil inhibited chronic adjuvant arthritis in rats.<sup>27</sup>

#### **Thermogenic activity**

Studies suggest that the pungent principles of ginger stimulate thermoregulatory receptors. Zingerone induced catecholamine secretion from the adrenal medulla in vivo and thus induced a warming action.<sup>27</sup>

#### **Anti-ulcer activity**

B-sesquiphellandrene, B-bisabolone, curcumene, 6-gingsulphonic acid and 6-shogaol were identified as anti-ulcer active principles from the dried rhizome when tested against hydrochloric acid or ethanol-induced gastric lesions in rats.<sup>27,31</sup> 6-Gingsulphonic acid was found to be the most potent compound.<sup>27</sup>

#### **Insect repellent activity**

The essential oil found to be highly repellent to the

cockroach, *Periplaneta Americana*, and the agricultural pest bruchus pisorum.<sup>27</sup>

#### **Antiviral activity**

B-sesquiphellandrene exhibited significant anti rhinoviral activity against rhinovirus B in vitro.<sup>27</sup>

#### **Nematocidal activity**

6-Shogaol and 6-gingerol were lethal to *Anisakis* larvae at doses of 62.5 and 250 Micro-grams / ml. A synergetic effect appeared to exist between the two compounds,<sup>27</sup>

#### **Antibacterial activity.**<sup>27,31</sup>

#### **Anti-protozoal property.**<sup>27,31</sup>

**Anti-diabetic agent-** It also works as a hypoglycemic agents.<sup>27</sup>

#### **Anti-fungal property.**<sup>33,31</sup>

#### **Anti-allergy.**<sup>31</sup>

#### **Anti-tumor.**<sup>31</sup>

**Anti-hair growth:** external use.<sup>31</sup>

#### **Sammiyat (Toxicity)**

It is mentioned in the herbs listed as safe herbs in a report of American food and Drug Administration (FDA) (Anonymous, 1993) but may cause harm to throat, it may produce inflammation and loosen the stomach.<sup>12,22,23</sup>

#### **CONCLUSION**

Present review revealed therapeutic importance of ginger rhizome as evident by the recent research performed on it. Several Unani formulations containing dry ginger is indicated in liver, kidney, stomach, joint diseases and as an aphrodisiac etc.<sup>1,13</sup> Recent researches also validated the indications of *Zingiber officinale* rhizome in Unani Medicine such as in liver debility, oblivion, sciatica, arthritis, rheumatism, as an liver tonic, anti-inflammatory, aphrodisiac etc. Beside traditional therapeutic utilization in Unani medicine its new indications such as anti-emetic, hypocholesterolaemic, antioxidant, antimicrobial activity etc, make it more important easily available household drug. Further scope of research can also be explored with the help of traditional knowledge exist in Unani and other traditional medicine.

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