



## THERAPEUTIC ROLE OF ARAGONITIC OTOLITH (SANG-E-SAR-E-MAHI) FOR NEPHROLITHIASIS IN UNANI MEDICINES

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### ABSTRACT

Nephrolithiasis or kidney stone is one of the most common health issues affecting approximately 15 % of the world population. In India alone, about 2.3% population is affected by kidney stones. The formation of stone is a complex process and its aetiology depends on several factors including drinking too little water, obesity, high salt or sugar intake. As per mineral composition, there are various types of kidney stones but the most common type is calcium oxalate. The kidney stones vary in the size from as small as grain to as large as a golf ball. The treatment and prevention of recurrence of kidney stone have always been a challenge for humans. The Unani system of medicine contains a number of formulations which are quite useful in the of treatment of kidney stones. Most of these formulations contain one major ingredient namely Sang-e-Sar-e-Mahi (Otolith). Otoliths are believed to have lithotriptic properties and hence remains part of various traditional medicines as lithotriptic agent. Otoliths are found in the inner ear cavity of all teleost fish and serve as a balance organ and also aid in hearing. They are composed of mainly calcium carbonate with minor proportion of other elements such as iron, potassium and silica. The current study aims to explore the role of otoliths in the treatment of kidney stones in Unani system of medicine.

**KEYWORDS:** Otoliths, Nephrolithiasis, Sang-e-Sar-e-Mahi, Calcium carbonate.

### INTRODUCTION

Kidney stones or Renal calculi are hard deposits made of minerals and salts that form inside the kidneys. There are majorly four types of kidney stones; Calcium oxalate, Struvite, Uric acid and Cystine. Calcium oxalate is the most common type of kidney stone which is formed when calcium combines with oxalate in the urine.<sup>[1,2]</sup> Several reasons contribute to the formation of this type of kidney stone; inadequate fluid intake, certain diets with excess intake of oxalates and calcium, excess body weight and certain medical conditions. Urine has various wastes dissolved in it. When there is too much waste in too little liquid, crystals begin to form. The crystals attract other elements and join together to form a solid that will get larger unless it is passed out of the body with the urine.<sup>[2]</sup>

Man started his quest to find the effective treatment of kidney stones ever since the urological disorder came into his knowledge. The surgical removal of kidney stones seems to be the better finding in its history of effective cure but various alternative treatments were discovered during the course of time. One such potent treatment is provided by Unani system of medicine.

There are various Unani formulations such as Kushta-e-Sang-e-Sar-e-Mahi, Sufoof-e-Hajr-ul-Yahood & Dawae-Gurda which are beneficial in the treatment of renal calculi.<sup>[3]</sup> Almost all of the Unani formulations used for kidney stone treatment contain otoliths as one of the ingredients. Otoliths are believed to possess lithotriptic effects. The word otolith is derived from two Greek words oto - ear and lithos – stone. An otolith is largely composed of calcium carbonate and found in the sacculle or utricle of the inner ear, specifically in the vestibular system of vertebrates.<sup>[4]</sup>

Since the most common type of kidney stone is composed of calcium, it doesn't mean that one should avoid to have calcium rich food. Some food items having calcium actually help prevent stone formation as the calcium binds with oxalate before it deposits in kidneys. People with the lowest dietary calcium intake have an increased risk of kidney stones.<sup>[2]</sup> Otolith contains high amount of calcium and also helps to check the stone formation.<sup>[5]</sup>

### Otolith description

The otoliths are biomineralized ear stones that contribute to both hearing and vestibular function in fish.<sup>[6]</sup> They are brownish white in colour, hard in texture and trigonal and flat in shape. Otoliths also help in determining the age of the fish.<sup>[7]</sup> There are three types of otoliths found in fish and all of which aid fish in balance and hearing.

**Sagitta:** Sagitta is involved in the detection of sound and the process of hearing, or converting sound waves into electrical signals.

**Asteriscus:** This type of otolith is involved in the detection of sound and the process of hearing.

**Lapillus:** This type of otolith is involved in the detection of gravitational force and sound. Different species have otoliths of different shapes and sizes; and cartilaginous fishes, such as sharks, skates, and rays, have none.<sup>[8]</sup>



Fig. I: Otolith (Sang-e-Sar-e-Mahi).

### Composition of Otolith

Otolith composition is comparatively pure to most biological and mineralogical structures and contains chiefly calcium carbonate. A total of 31 elements have been detected in otoliths so far. The elemental composition is dominated by the major elements calcium, oxygen and carbon, which form the calcium carbonate (CaCO<sub>3</sub>) matrix. However, most of the elements are present at the minor level.<sup>[9]</sup>

### Unani Concept of Nephrolithiasis (Hasaat-e-Kuliyah)

According to Ibn-e-Zohr (1091-1162 AD), when the kidney is unable to excrete out the thick humours due to its weakness, then these thick humours become deposited inside the kidney as layer-by-layer crystallizations ultimately resulting in stone formation.<sup>[10]</sup>

### Therapeutic Use of Otolith in Unani Medicines

Kidney stones cause problems when they block urine flow inside or outside of the kidneys. If the size of the stone is smaller, it is typically expelled by the body through passage of the urine stream. Many stones are formed and passed without causing any symptom in the

body. But if the size of the stone is more than 6mm, it may often cause severe pain in the abdomen, groin and flank and sometimes even become the reason of blood in the urine.<sup>[11]</sup> The most common type of kidney stone contains calcium oxalate; as otoliths has high amount of calcium carbonate, it generally prevents the formation of stone by reacting with oxalate which is regularly formed in the body as by-product of certain foods.<sup>[2]</sup>

### CONCLUSION

Otolith has high significance in Unani system of medicine as a Nephrolithiasis preventive mineral drug. It is used as a lithotriptic agent. A number of Unani formulations Kushta-e-Sang-e-Sar-e-Mahi, Sufoof-e-Hajr-ul-Yahood, Dawa-e-Gurda etc. which contain otoliths as an ingredient are safe and effective in the treatment of Hassat-e-Kuliyah (Kidney stone). Hence, otolith is useful in providing an alternative treatment of Renal calculi.

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