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Ethnopharmacology and historical folk medicine of bezoar stone and its relationship to modern trichobezoar concept

Peyman Mikaili [1] and Jalal Shayegh[2]

[1]Department of Pharmacology, Faculty of Medicine, Urmia University of Medical Sciences, Urmia, Iran
[2]Department of Veterinary Medicine, Faculty of Agriculture and Veterinary, Shabestar branch, Islamic Azad University, Shabestar, Iran

Abstract

Bezoars are pathological conglomerate masses formed of food or fiber in the alimentary tract of humans and certain animals. It is a Persian word and concept, which historically dates back in the classical period of Persian medicine, and called *Pādzahr*, meaning "protective against poison". Classically it is described in the stomach of goats and other ruminants and assigned medicinal properties. It was believed that, it prevents and heals the poisonings and animal stings. For this, it was considered a precious remedy for physical and psychological disorders. There are some evidences that, it is still used in some regions worldwide for these purposes. This study was a review in the medical modern and classical literature for the ethnopharmacology and folk medicine concepts and knowledge about bezoars.

Keywords: Curative Stones, Antidotes, Bezoars, Folk Remedies, Poison Treatment, Persian Traditional Medicine

Introduction

Bezoars, although rare, are likely to pose clinical problems when they enter into the differential diagnosis of disorders causing abdominal pain, or when they are encountered by chance in x-ray examinations of the abdomen. Reports of bezoars have appeared periodically in the literature since M. Baudamant in Paris described the first case in man in 1779. A bezoar is a bulky mass of a type of foreign material occurring in the stomach or intestine of man or animal (Haley, 1957; O'Sullivan, 2001; Anderson, 2005). The modern orthodox medical community commonly views bezoars as gastrointestinal anomalies requiring treatment. However, that was not always the case. In the past, they were widely regarded as a remedy by all levels of society, including the well-to-do and even royalty. Several bezoar stones were discovered among the cherished items reclaimed from the sunken Spanish treasure ship, Nuestra Senora de Atocha. Today, especially in rural areas, medical powers are still ascribed to bezoar stones (Shultz, 2010). Bezoars are concretions in the gastrointestinal tract that increase in size by continuous accumulation of non-absorbable food or fibers. This article reviews the medical literature on traditional medical descriptions and uses of bezoars.

We have reviewed the medical modern and classical literature for the ethnopharmacology and folk medicine concepts and knowledge about bezoars. For the modern concepts, we reviewed almost aspects of the problem in the up to now published articles. The pathology, etiologies (including gastrointestinal obstructions, surgeries, stenosis, hepatobiliary and psychological causes etc.), and remedies and special cases have been evaluated and discussed in this column. For classical evidences of the knowledge and uses, we have chosen the treatise of Imad-ul-Din, a doctor lived in Islamic period. This review is greatly based on the nice article of Elgood in Annals of Medical History (Elgood, 1935). The different aspects of classical postulations about bezoars have been evaluated. They include the beliefs about the action of the stone, different types of bezoar stones, namely the Khorasan stone, and those of other regions; classical methods for weighing of the stone, and methods of eating the bezoar stone.

Historical aspects of bezoar

As mentioned before, for classical evidences of the knowledge and uses, we have chosen the treatise of Imad-ul-Din, exerting the contents from a nice article of Elgood in Annals of Medical History (Elgood, 1935). Elgood begins his article as follows. Of the many gifts of Persian science to European medicine, the history of

few is more interesting than that of the bezoar stone. The very name in the English language is a corruption of the Persian word Padzahr, showing that it is to the Persians that Europe was indebted for the knowledge of this wonderful antidote. Adams in his appendix on “Substances introduced into *Materia Medica* by the Arabians” complains that he can find no “Arabian work” (by which presumably he means Persian or Arabic) on the subject, excepting the book of Ibn-ul-Baytar, and “his account is very indistinct and unsatisfactory.” Although the great majority of the medical writers of the Persian School of Medicine briefly describe the action of the stone and several give a description of the various kinds that are employed, yet this complaint is just. Elgood believes this work is the earliest one on bezoars. He continues: it is necessary at the outset to classify stones into true and artificial. The true stone was a natural calculus, though Persian writers are at times prepared to admit as genuine the vegetable and mineral bezoar stones, which it would be more just to classify as artificial. The genuine stone appears to have been calculus found in the belly of a wild goat that inhabited the Northeast corner of Persia. The belly must be understood to include both stomach and gall bladder-Persian writers themselves are undecided which organ was the true source, but definitely exclude the urinary bladder. The artificial stones were an artifact of wax and herbs. This stone, whether taken internally or used externally, was held to be an antidote against the bites of snakes, all venomous insects, and the majority of vegetable and mineral poisons. Its curative effect was later extended to include plague, epilepsy, smallpox and certain fevers, for all of which it was held to be a specific.

So universal was its application that by the seventeenth century Persian writers use the word "padzahr" to mean "antidote" in general, and use treatise here presented asserts that the Greeks had knowledge of it. But I can find no confirmation of this. That it was used in the East before the preaching of Islam would seem sure. It is stated that it was known to the Hebrews of ancient times, who termed it Bel Zaard, which means "the master." But the impetus to its general use was supplied by the physicians of the Arab School of medicine. Mahomed ibn Zakariyya AI-Razi (Rhazes) (850-932 A.D.) mentions the stone both in his "Continents' and in his Al-Mansuri." Ali ibn Ul-Abbas (Haly Abbas), who flourished in the second half of the tenth century, speaks about the stone in his Kitab-ul-Maliki (or Liber Regius) and Abu Ali ibn Sina (Avicenna) (980-1037 A.D.) in his "Canon of Medicine" makes several passing references to its efficacy. The first reference to the stone in European scientific literature would appear to be in a work of Avenzoar, an Arab physician of Seville, about the year 1140 A.D.

To return to Persia once more. The court of Shah Abbas and his successors, so prolific in pharmacological treatises, produced many handbooks dedicated to an exposition of the action and usage of the bezoar stone. The earliest that I have discovered are the "Alfaz-ul-Advia" (or Vocabulary of Drugs) by Nur-ul-Din Mahamed, the "Ain-ul-Mulk," of Shiraz, Written in 1628, the "Risala-i-Padzahr" (or Handbook of Bezoars) of Mirza Qazi bin Kashaf-ul-Din Hamawi of Yezd, written about 1650, and the "Tuhfahi- Sulimani" (or Gift of Solomon) of Mahomed Kazim Teherani written in 1668. But prior to all these, and presumably the prototype upon which they were modeled, is the treatise which is here presented, which was composed by Hakim Imad-ul-Din Mahmud ibn Masud bin Mahmud. Mahmud bin Masud, who bore the title of Qutab-ul-Din and who flourished 300 years earlier. The similarity of the names and the fact that both had an uncle of the name of Kamal-ul-Din, the Physician, led me into this error. Further reading of the manuscript has shown me that the writer speaks there of Qalaun as the reigning Sultan of Egypt and Qalaun reigned from 1279 to 1290 A.D. And in the second place, there is other evidence to show that a Mahmud bin Masud, a physician, accompanied by an uncle, also a physician, did go to Egypt about 1280 on an embassy from the Shah of Persia. The story of Imad-ul-Din's wanderings to Baghdad, Constantinople and Egypt in search of medical lore, as well as his ophthalmic appointment in Shiraz, being derived from the Tahfat-ul-Sadiyeh, must, I regret, be ascribed to his earlier namesake. At Meshed Imad-ul-Din became "personal physician to Prince Ali ibn Musa ul-Reza, the Governor." My learned Persian friend Doctor Saeed Kurdistani has pointed out to me that this is not the name of a governor of Meshed, but the name of the Saint who is buried here and that the Persian phrase should properly be interpreted "physician attached to the shrine of Our Lord Ali ibn Musa Al-Reza." He refers to the Saint again on page 467 of the translation. The word that I translate as "friendship" should there be rendered as "service". His only surviving work that is written in Arabic, including: Risala-i-Yanbu fi Ilm-il-Tibb (Rivulets in the Healing Art); A Treatise on the Beneficial and Injurious Properties of Opium; A Treatise on the China Root; A Treatise on the ezoar Stone, the subject of the present paper; Risala-i-Mujarrabat (The Handbook of xperience); Nuskha-i-Badal-i-Afyun (Prescriptions of Substitutes for Opium); Dar iyan-i-Baz Tarakib (A Second Volume of Prescriptions); A Fragment on Pharmacy; A Treatise on Anatomy; and Risala-i-Atishak (A Treatise on Syphilis).

In the Treatment of Hippocrates it is related that a certain substance is brought from Fars to which has been given the name of Hajar-ul-Tis or *Goat Stone*. It is a product of the hills and desert. It has a milky

appearance and is neither rough nor smooth. When split open, it is found to be a series of skins or layers, like an onion. Within the innermost skin instead of a kernel, is a piece of green grass round which the skins and layers have been wrapped, as it were. This is known as a *Grass Bezoar Stone*.

Therapeutic effects of bezoar

If the Stone is ground up with an infusion of fennel and applied to the sites of poisonous bites, at once the pain is relieved and the poison is extracted. I myself once saw a man who had been bitten by a hornet. The site of the sting swelled up and became very red. A little of this Bezoar Stone was ground up with water and applied to the sting. At once, wherever the effects of the ointment reached, the natural color was restored and the swelling subsided. There is, too, the story of some generals, who were summoned to a conference during the war and there saw a man who had been bitten by a snake. Since it was a time of war and they had at hand none of the *Great Theriacum*, they dissolved in pure wine about six barley grains' weight of the bezoar. Other people say that the bezoar is a kind of stone, similar to one that is made from wax, lime, and clay; for it obviously consists of three parts. When it is ground up in a mortar with saffron, it turns red, like drops of blood. If it is rubbed over the site of insect bites and include snake vipers and scorpions-at once the pain is relieved. Kings value this stone immensely. This kind of stone, too, is called a Bezoar Stone. I myself have seen monarchs who have prepared a draught of the stone and who have set it in the midst of precious jewels. Whenever anyone was stung by a hornet, they poured a little of the draught into some milk and after a little while gave it to the man, who had been stung, to drink. At the same time they rubbed the place of the bite with the Stone. After this, the milk was vomited up and the body of the patient scarified. And at once he was relieved.

The Khorasan Stone

Some say that mention of the Bezoar Stone is found in the very earliest times, but that the ancients did not know its properties. They did, indeed, describe a stone found underground and relate that this stone was brought from Fars, which resembles the Bezoar in appearance and shape. But they used to make it into the haft of a knife and put it to no other purpose. Some say that the best antidote is the *Thetiacum* which the people of Khorasan have discovered. It is an antidote comparable to the Goat Stone and is called the *Taryaq-i-Faruq-i-Tis* or *Theriacum of Goats*. It looks like an acorn, being round and long, and is laminated. Within there is something which might be a kernel, but is merely a piece of wood or a seed.

Stones of Other Regions

The author of the Mufradat (or *Medicamenta Simplicia*) states that the Bezoar Stone is taken from Khorasan alone; though this is not correct. Others state that the only place in which it can be found is Shabankarah and nowhere else. This, too, is incorrect. For it is to be found in Hindustan, in Golconda, several parts of the Deccan and above all in Kanpura and the surrounding district. The Bezoar Stone of these parts frequently will weigh three or four tolas; as they do also in the province of Waranku. The majority of the sheep of those parts contain a specimen, which they export to Europe, China, and to Malacca. In China there is a stone derived from monkeys, the very kernel of which may weigh four or five tolas. One of these was bought for 500 shamuns, which is the equivalent of 30 Persian tumans, and sold in the royal court. The buyer encrusted it in jewels. Another kind is the stone from a cow, which is found in the Deccan. This is usually round and of little value. The Deccan Stone, besides being found encircling a twig, may also have as its core a tamarind seed or a bead, or even a piece of pottery or stone. The sheep are really a species of goat, which live in the desert or the hills. Similarly, the Stones of Shabankarah are obtained from mountain goats. The son of the author of the Mufradat in his marginal commentary writes “When my father in his Mafradat says that the Bezoar Stone can be brought only from Khorasan”, he was speaking metaphorically; as were his remarks that Shabankarah is the only place in the world where it can be found and there also it can be found.

Weight of the Stone

The weight, too, is a subject of dispute. I have seen them varying from a single grain to twenty *miscals*. The bigger they are the better. It is well-known that a little one may resemble the pip of a grape and that the weights may vary from a grain to twenty *miscals* and then not be complete. Nevertheless, this is of no importance, for great or small, whichever excels in its essence, is the best. I, Khalil, the physician, once saw one that weighed 30 *miscals*; the owner said that it was obtained from a cow.

Method of eating the Bezoar Stone

Some have shown that the stone, when eaten, should not touch the teeth, for it causes the teeth to break. The right way to take it is first to clean the stomach and body of humors, and then after a rest of three days to grind up every day two grains in milk or rosewater, so that after three days six grains will have been taken. A good hour later a draught of sugar and rosewater should be taken, and then about noon some pulse-water and bread may be eaten. The patient should after this avoid milk dishes, all bitter foods and all that gives rise to obstruction.

Another Method

Take some Ethiopian aloes wood, a precious ruby, mastich, white ambergris, pure musk, gold and silver leaf, and white bamboo concretions. Grind up the drugs and put them through a sieve. Grind up the Bezoar Stone and the ruby, and mix them with the juice of a sugar cane. Divide this into three portions and eat one portion every day. Then proceed as above. Anyone who observes this method of taking the Stone at the beginning of the spring and at the beginning of the autumn, above all anyone of middle or advanced age, will find that his innate heat becomes increased, his bodily powers multiplied, and he will become immune to many poisons. In the second place, it is the name applied to a well-known stone, which by some inherent property drives out poisons, both hot and cold, whether taken by the mouth or hung round the neck. Aristotle wrote that the Bezoar Stone might be of many colors. Some are yellow, some dust-colored, some khaki, and some are whitish. The best of all are the yellow and next come the dust-colored. Rhazes writes that the Bezoar Stone is a yellow stone, soft in essence and very useful as an antidote, and that he himself had seen the great use and potency of the Bezoar in driving away the poisonous effects of aconite. The Stone that he saw was yellowish or white and had fine hairs, like the hairs on the back of a fish. In its resistance to aconite no drug, simple or compound, that he had ever seen, could rival it. Ahmed Yusuf writes that the Bezoar Stone is hot and that in its heat lies its power. If the heart of a man becomes weak from sorrow, let him eat the sixth of a *miscal* and he will be helped and his heart strengthened. He writes also in his Jami that the animal, which produces the Stone, is the mountain goat. The properties of the Stone are so far superior to any other antidote that, if to-day half a grain of it be administered to a healthy man, no matter what deadly poison be given to him, he will receive no harm or damage there from. It produces no heat nor does it throw the humors together, in which respect it differs from the *Mithridatic Theriacum* and others. For it produces its effect by its own inherent qualities. Sometimes it is set in gold and run with water. To sip this sweat is very good for acrid fevers and for ophthalmia. Weight of two barley grains is ground up and mixed with water and then poured into the mouth of a viper or snake, it will die of suffocation. Written by the hand of the humble Mahomed Ali bin Saadi Ali Al-Hussein; the Physician, whose sins may God forgive.

There is a stone which is brought from Khorasan and which is called the Bezoar Stone. There are also stones found in mines in the cities of China, India, and the West, which greatly resemble the Bezoar. But none of these have the properties and uses of the Bezoar. The genuine Bezoar Stone is a noble and precious stone. In a word, it is soft, but not excessively. This is noticeable to the touch. It may contain numerous fine hairs all woven together. Its heat is not excessive. Its specific property is that it has the great power of being able to drive out all animal and vegetable poisons and cures the bites of animals. A weight of twelve barley grains, powdered up and cooked and then swallowed, will drive out from the body all poison by way of the sweat and excretions, and will preserve from death. If a stone is worked into a necklace or set in a ring and the wearer place it in his mouth and suck it after he has taken any poison, it will be very beneficial. Or, if the ring is robbed over the place of the bite of a scorpion or flying insect or over anyone who has taken a poison, such as arsenic, or over wasp-stings, its use is evident. If it is powdered up and sprinkled over the plate of the bite of any crawling insect, it draws out the poison. If the site of the bite has become infected before the remedy can be applied, even then, if the Bezoar Stone be drunk, the place will be made poison driven out, and the corrupt flesh renewed.

Etymology of Bezoar: English bezoar, late 15th century, ultimately from Arabic *bazahr*, from Persian *pad-zahr*, meaning counter-poison, compare Pahlavi *pādzahr* [پادزهر p'tzhl], from *pad* "protecting, guardian, master" (from Iranian **patar-*, cf. Avestan *patar-*, from Proto-Indo-European **pa-tor-*, from base **pa-* "to protect, feed") + *zahr* "poison" (from Old-Iranian **jathra*, from Proto-Indo-European **gwhn-tro-*, from base **gwhen-* "to strike, kill"). Originally "antidote," later specifically in reference to a concoction from solid matter found in the stomachs and intestines of ruminants, which was held to have antidotal qualities (MacKenzie, 1971; dictionary.com, 2011; Hasandust, 2004).

The types of bezoars in modern medical terminology

There are various specific sub terms that can be used for describing different types of bezoars: *Diospyrobezoar* is a bezoar formed from persimmons; *Enterolith* (bezoar stone) is a calculus type of bezoar; *Food bolus* is a loose aggregate of food items such as seeds, fruit pith, or pits, shellac, gum, soil, and some medications that is not quite a true bezoar; *Pharmacobezoars* are medication bezoars made up of masses of drugs; *Phytobezoars* are composed of nondigestible plant material and are a complication of decreased gastric or intestinal motility due to disease or treatment; *Tracheobezoar* specifically refers to a trichobezoar in the trachea; *Trichobezoar* is a bezoar formed from hair - hairball, Rapunzel syndrome (Wings, 2007).

Discussion and Conclusion

Considering the classical postulations of bezoars, it will be interesting its comparison with the modern

concept of bezoars. Here, we have reviewed the modern concepts for almost aspects of the problem in the up to now published articles. The pathology, etiologies (including gastrointestinal obstructions, surgeries, stenosis, hepatobiliary and psychological causes etc.) remedies and special cases have been evaluated and discussed in this column.

An unusual form of bezoar extending from the stomach to the small intestine or beyond has been described as Rapunzel syndrome. Most bezoars in children are trichobezoars from swallowed hair from the head, dolls, or brushes. Trichobezoars typically cause abdominal pain and nausea, but can also present as an asymptomatic abdominal mass, progressing to abdominal obstruction and perforation. Trichobezoar with Rapunzel syndrome is an uncommon diagnosis in children with less than 40 cases reported. It is predominantly found in emotionally disturbed or mentally retarded youngsters. Cases have been recorded in young with Rapunzel syndrome in the United States with mental retardation who presented with abdominal pain, vomiting and a non-tender abdominal mass (Gonuguntla, 2009; Naik, 2007; Al-Wadan, 2006). It is also considered as an important cause of abdominal pain presenting to the pediatric emergency department (Lynch, 2003). Some reports discuss that trichobezoars are local problems. Mehta and Bhutiani suggest that the majority of reported cases are from Asian countries. Another report highlights the need for a higher index of suspicion, particularly in Asian girls to avoid missing the diagnosis and early elective intervention (Mehta, 2009). Gastric bezoars may be occurred after solid-organ transplantations. A report described the occurrence of gastric bezoars in two patients who underwent sequential single-lung transplantation for severe chronic obstructive pulmonary disease, and analyze the possible pathophysiologic mechanisms responsible (Folch, 2007). Lactobezoar is a compact mass of undigested milk concretions located within the gastrointestinal tract. Most often found in infants, they could precipitate gastric outlet obstruction, mimicking a variety of medical and surgical conditions. A common etiology and method of cure have yet to be elucidated. A review of the literature provides some insight into causes, clinical presentations, diagnosis and management. Data from the Medical University of South Carolina further help dispel the belief that lactobezoars are isolated to pre-term infants on caloric-dense formulas. Findings suggest bezoar formation may be more common than previously thought and a high index of suspicion could help avoid costly evaluations for obstructive symptoms (DuBose, 2001).

Some studies discussed trichotillomania and trichobezoar. Trichotillomania is an intriguing psychosomatic entity in which there is an irresistible desire to pull out the hair from the scalp, eyelashes, eyebrows and other parts of the body. The process results in an instant release of tension, a sense of relief and security. However, non-scaring alopecia is its clinical presentation. The development of trichobezoar following ingestion of the pulled hair is its salient complication in a few cases. Subsequently, it may cause symptoms pertaining to the gastrointestinal tract culminating in intestinal obstruction, perforation, pancreatitis and obstructive jaundice. In most cases in children, trichotillomania +/- trichobezoar is a habit disorder and thus has a better prognosis. However, in adults the psychopathology is usually deeper and thus entails a poor prognosis. The diagnosis is made after taking a thorough history, noting the clinical features and evaluating a hair-root examination, where telogen hair is (almost) completely lacking, which distinguish trichotillomania from other hair disorders. Treatment modalities vary in childhood and adult varieties. Apart from psychotherapy, the drug treatment involves several agents including selective serotonin reuptake inhibitors and domipramine. Trichobezoar/Rapunzel syndrome requires surgical intervention. (Stone, 1998; Sehgal, 2006; Morales-Fuentes, 2010).

Gastroparesis is considered as an etiology of bezoars. Gastroparesis is a manifestation of diabetic autonomic neuropathy. Gastrointestinal autonomic neuropathy contributes to morbidity, mortality, reduced quality of life and increased healthcare costs of a patient with diabetes mellitus. Complications from gastroparesis include ketoacidosis, infection and also bezoar formation (Feigenbaum, 2006). Trichobezoar may be an uncommon entity and secondary gastric perforation is exceptional. In a report the patient was a teenager with clinical symptoms of epigastric mass and acute abdomen. Radiological study showed pneumoperitoneum and intragastric mass. Personal history revealed depressive syndrome and anxiety. Urgent laparotomy confirmed the diagnosis of gastric perforation due to a trichobezoar completely moulding the gastric chamber. The diagnosis was suspected on the basis of radiologic images but laparotomy was required to confirm it (Pérez, 2005). Additionally, the obstruction of small bowel may be another cause to trichobezoar. The discovery of trichobezoars in the bowel may be due to primary formation, which is improbable, or to fragmentation in the stomach followed by migration of the fragments, which in the case presented could be favored by the patient's previous operation (Corona-Cruz, 2005). Some drugs are known to induce bezoar such as sucralfate with milky (lipid containing) foods. There are reports about the association of sucralfate and bezoars in French System of Pharmacovigilance the literature. Sucralfate is used in the management of peptic ulcer. At pH < 4,

extensive polymerization occurs and a sticky viscid gel is formed. In view of this inquiry, the French System of Pharmacovigilance decided to advise caution for adults in intensive care unit being fed by nasogastric tube and contraindication in premature babies and dysmature newborn babies receiving sucralfate (Guy, 1999).

Bezoars are pathological masses formed in the gastrointestinal tract of man and animals, classically in the stomach of goats and other ruminants and assigned medicinal properties. It is a Persian word and concept, which historically dates back in the classical texts of Persian medicine, called *Pādzahr*, meaning "protective against poison". It was believed that, it prevents and heals the poisonings and animal stings. For this, it was considered a precious remedy for physical and psychological disorders. There are some evidences that, it is still used in some regions worldwide for these purposes. This study was a review in the medical modern and classical literature for the ethnopharmacology and folk medicine concepts and knowledge about bezoars.

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