An Informative Review On Calcinated Oyster Shell (*Kushta-E-Sadaf*)

Shahla Parveen[1], Mohammad Khushtar[*1], Md. Arshad[2], Md Afroz Ahmad[3], Mohd Ajmal[1], Md Sohel Akhter[1]

[1] *Department of Pharmacy, Integral University, Lucknow.*

[2] *Department of Zoology, Aligarh Muslim University, Aligarh.*

[3] *Department of Pharmacy, Jamia Humdard, New Delhi.*

[*] *Address of correspondence: Department of Pharmacy, Integral University, Lucknow.*

Tel: +91-7007529616; E-mail: mohdkhushtar@gmail.com,

Abstract:

Since long, conventional drugs have been utilized in the Indo-Pak subcontinents. The most realized frameworks utilized customarily are Ayurvedic and Unani therapy. Both of these frameworks utilize spices, minerals and creature tissues in various ailments. Kushta is derieved from Persian word 'KUSHTAN' which signifies 'killed or won'.

Kushta is a significant class among the compound detailing which is ready by burning endorsed metals, minerals, and creature parts beat and pulverized with suggested measure of plant remove, further exposing it to the traditional cremation strategy utilizing cow manure cakes.

Sadaf (Pinctada margaritifera), a marine beginning normal shell in its Kushta structure, is a solution for various issues, shown in heart shortcoming (zouf-e-qalb), leukorrhea (sailan-ur-rahem), discharge (nazuf-ud-dam), calcium insufficiency (qilat-e-kils), menorrhagia (kasrat-e-hat), fever in tuberculosis (huma-e-sil-o-diq), asthma (zeeq-un-nafs), ongoing hack (surfa-e-muzmin), sexual weakness (zouf-e-bah), hemorrhoids (bawasir), and acid reflux (zouf-e-hazam). It contains different minerals like calcium, iron, copper and bromide important for the human body. Kushtas are nano-crystals having the size of 1-100 nm and are known for their therapeutic effect. Sadaf (Oyster shell) is the covering of a marine animal. Kushta-e-Sadaf is rich in calcium, iron, and copper and it is used in the treatment of such innumerable major issues like cardiovascular issue, sexual failure, and renal issue. This review covers the methods of preparation of kushta e sadaf and its benefits in medical and non-medical fields.

Keywords: *Kushta-e-sadaf, oyster shell, Pinctada margaritifera*

1. Introduction

1.1. Sadaf

Sadaf is an Arabic word which is known as ‘Goshe Mahi’ in Persian, ‘Seep’ in Sindhi, ‘Shonk’ in Bengali and Oyster shell in English. It (Sadaf) is the covering of a marine animal known as oyster. It is from a variety of an oyster (*Pinctada margaritifera*) from which we get pearls. This kind of pearl is known as ‘Sadaf-e-Marwareed’ or ‘Sadd-e-Sadaf’ (real Sadaf). Temperament of Sadaf: Cold and dry; It prevents diarrhoea, bleeding and asthma. Dry Sadaf is more potent in these diseases.

1.2. Marwareed (pearls)- In Arabic ‘pearl’ is known as ‘lulu’, ‘Marwareed’ in Persian, ‘Moti’ in Hindi, and pearl in English. Marwareed is a famous thing which is produced in a kind of shell, i.e., covering of oyster. Its small grains are equal to poppy seeds and used as a medicine. They are taken out from Indian ocean and other seas. It’s temperament is moderate. To some extent it is cold and dry. It plays a secondary role in strengthening the main organs of body, eyes; and prevents asthma.[1]

Oyster shell, is one of the naturally occurring dietary source of calcium which is obtained from marine shellfish (*Pinctada margaritifera*) and has been an equipped raw material as an anti-osteoporotic agent.[2, 3] The macroscopical structure of oyster shell is shown in the figures.

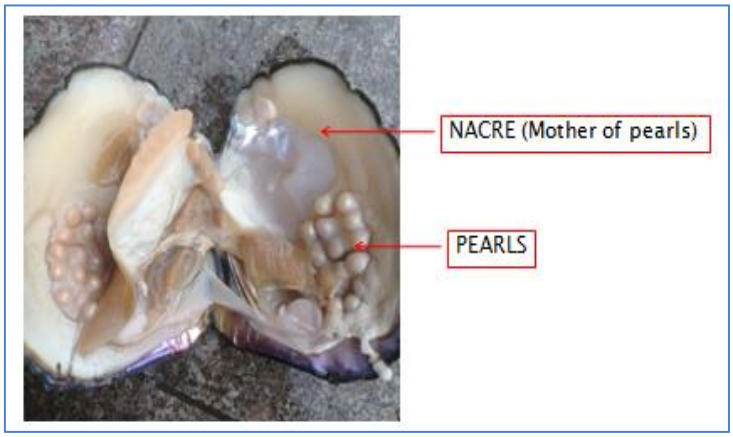

Figure 1: *Pinctada margaritifera*

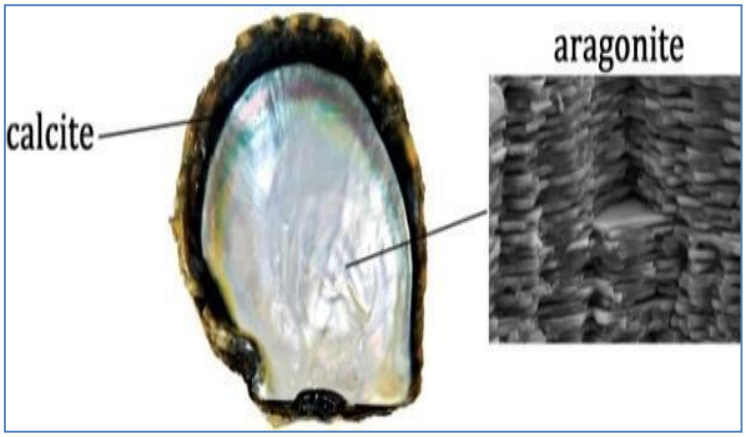

Figure 2: The shell of the pearl oyster *Pinctada margaritifera*

The term Kushta refers to the finest powdered medicines obtained by burning metals, minerals and, in some cases, animal-derived medicines. Herbal medicines are processed in a special process called calcination, transported in a closed crucible, placed in pits of various sizes, laid with multiple dung cakes, and the heat intensity produced by the dung cakes varies. increase. Kushta (calcination product) is easily absorbed by the human body and is highly effective. Kushta is a dosage form that has long been used in the classic texts of Yunani literature because it is so effective in the prevention and treatment of various diseases. [4]

Essentially, a Kushta is a mixture of mineral(s) and natural extract(s). In the conventional framework, the term is utilized for those measurement structures, which are effective in little portions and produce immediate action. [5]

These arrangements have for a long while been used by standard healers and are proclaimed to be strong are as yet utilized today in these frameworks.

Due to lack of availability of books in English or other regional languages, a large portion of the population is unaware of the benefits & advancement of Unani Medicines.

Unani preparations for the most part present in the market in conventional dose structure yet, presently unique judicious procedures of Nanotechnology are being developed now daily to convey regular medication due to their poor rate of absorption and target explicit approach. In Unani Medicine. Kushta (Calx), the most antiquated type of Nano-medication is used starting around 1000 BC. [6]

Recent reports proved that the nano-medicines reduce the dose as well as cost of the drug, decreasing its side effects and increase in bioavailability and development of targeted drug delivery.

Keeping in view the therapeutic importance of unani/herbal medicine, here we are focusing the Kushta e sadaf, a unani medicine which is available as nanoparticle. [7, 8]

2. Methods of preparation of kushta-e-sadaf:

Method I: Placing it in the paste of Indian hemp, Sadaf should be warmed for a few hours in vinegar or gruel; chopped into pieces; and placing it in a covered earthen bowl, put the extract of Psyllium seeds again. Warm it slowly and then warming twice and thrice, grind it into a powder and preserve.

Method II:-Take good quality ‘Sadaf’, place it on fire; after some time separate its impurities with a knife and then take the pure and clean Marwareed or Sadaf weighing 60 gram and grind it with extract of psyllium seeds and close it in an earthen bowl upon the fire made of ten ‘ser’ (1ser= 933.105gram) cow dung and grind it in a mortar and preserve. [1]

Method III:

a) Recipe:
   Sadaf sadiq (True Oyster shell) : 250gm
   Arq Gulab (Aqua *Rosa damascene)* : 375ml
b) Preparation of Kushta: the shellfish shells are ground, pounded sieved and pulverized progressively with little amounts of Aqua *R. damascene* till entire of the last is burned-

through. Tablets (approx. 10gm each) are produced using the resultant glue, dried, and calcined by Gil Hikmat procedure in a pit utilizing 20kg of cow fertilizer cakes as fuel. This yields a whitish Kushta which is gathered, powdered, sieved and pre-served in a container. [5]

Kushta made through the correct process of calcination should not return to its original state. [4]

Table 1 :Chemical composition of calcinated oyster shell

S.No.	Name of the element	Quantity				Reference
		KSFM	KSCM	KSMS	ICP-AES	[19,20]
1	Calcium	47.79%,	44.52%	42.19%	396.4 mg/g,	
2	Iron	294 ppm	235.8 ppm	998.1 ppm	67.89 ppm	
3	Copper	2.98 ppm	<0.1 ppm	1 ppm	1.050 ppm	
4	Bromide	5.3 ppm	10 ppm	-	5.3 ppm	
5.	Sodium	-	-	-	5.536 mg/g,	
6.	Magnesium	-	-	-	2.136 mg/g,	
7.	Strontium (Sr)	-	-	-	890.6 ppm	
8.	Phosphorus (P)	-	-	-	27.19 ppm	
9.	Boron (B)	-	-	-	12.17 ppm	
10.	Manganese (Mn)	-	-	-	2.308 ppm	
11.	Zinc (Zn)	-	-	-	0.7180 ppm	

Heavy metals (lead, cadmium, mercury, and arsenic) were found to be below the permissible limits given by the WHO in Kushta-e-sadaf classical method (KSCM), whereas in Kushta-e-sadaf furnace method (KSFM), lead was found to be 28.7 ppm which is above permissible limit. In Kushta-e-sadaf marketed sample (KSMS), two heavy metals namely mercury and arsenic were found to be 112 ppm and 12.3 ppm, respectively, which is above permissible limits and other two heavy metals were found to be below the permissible limit namely cadmium and lead.

3. Traditional uses of kushta-e sadaf:

Figure 3: Summary of Traditional uses of kushta-e-sadaf

As it is dry, cold and transparent, it is involved in making of toothpaste and toothpowder. It cleans teeth and gums. Dry Sadaf is used in preventing diarrhea, bleeding and asthma. It is also used with other medicines for the asthmatic patient. It is used with rose oil for the removal of wrinkles on face and treatment of reflux oesophagitis. The shining part of Sadaf is scraped and used in place of Marwareed. It is very useful in preventing bleeding. In addition it is used in bronchitis, burns, oedema, uterine problems, measles, smallpox, and to strengthen heart and brain. The Kushta-e-sadaf is restoratively utilized for treating the accompanying afflictions like Leucorrhoea & Spermatorrhoea. [1, 5, 9]

4. Pharmacological uses of Kushta e sadaf:

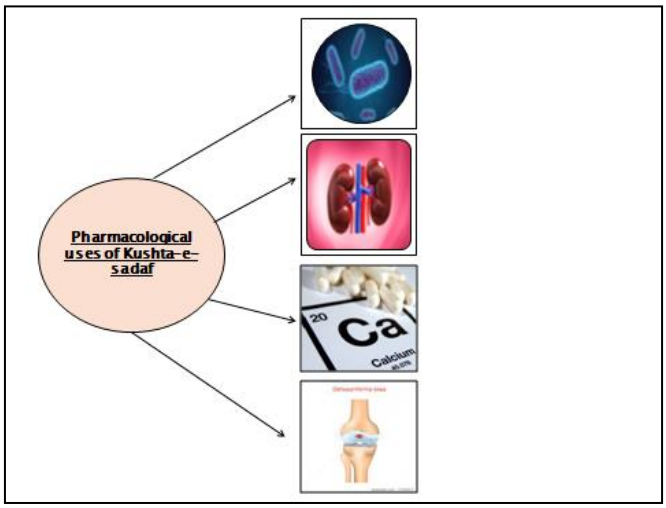

Figure 4: Summary of Pharmacological uses of kushta-e-sadaf

4.1. As antimicrobial agent:

The principle segments of uncalcined and oyster shells were CaCO3 and CaO, by which CaO was discovered to be the fundamental antimicrobial segment. Eminently, calcined shellfish

shells showed antimicrobial strength against both Gram-negative (*Escherichia coli*) and Gram-positive (*Staphylococcus aureus*). Moreover, cytotoxicity examination demonstrated that calcined oyster shells had great cell feasibility and low cytotoxicity. Results featured that calcined oyster shells, especially those treated at 750 °C, could be a biocompatible option in contrast to manufactured biocides and antimicrobial specialists utilizing in food bundling, biomedical, and corrective ventures. [10]

4.2. As calcium supplement:

Oyster shell, as the most useful result of marine monetary shellfish, has been one of a handful of the potential dietary calcium sources and been concentrated as a sustained item crude material for osteoporosis treatment. [2] In any case, oyster shell dominatingly comprises of calcium carbonate (CaCO3) and natural matter (4%). [11] In this manner, oyster shell is relied upon to be a decent wellspring of amino corrosive chelated calcium because of its minimal expense, plentiful calcium content and simple availability. [12, 13] Lately, calcium supplements from marine sources have acquired consideration because of their plentiful stores, high wellbeing, and organic movement. [14, 15] Marine mineral enhances the bone turnover and bone building and may help in forestalling wounds and fixing harmed bone in people. [16] As a plentiful wellspring of calcium, the utilization of sea life organic calcium is a significant method to improve the usage pace of natural assets.

4.3 Diabetic nephropathy:

Compound formulation which contains Kushta-e-sadaf was found effective in prevention of Diabetic nephropathy in rats. Kushta e sadaf is used traditionally as kidney protective and experimentally has been validated in diabetes induced nephropathy. [17]

4.4.As Anti-Inflammatory and Analgesics in Osteoartheritis

Kushta e sadaf is found to be effective in relieving inflammation and pain due to osteoarthritis. Dr. Hena Parveen in her case series study validated the efficacy of some Unani formulations in the management of osteoarthritis. [18]

5. Conclusion

In this study, we concluded that Kushta-e-sadaf which is nano-formulation of sadaf is found to be effective in number of areas. Sadaf has been used as Unani medicine from ancient times for the treatment of various diseases. Kushta is a formulation which makes it more effective as its size is reduced, having higher bioavailability, hence, dose required is less, which ultimately results in lesser side effects. The elemental analysis by classical and furnace method confirm the presence of calcium in kushta-e-sadaf and have found effective in suppressing the symptoms in patients of osteoarthritis. It can be utilized as a base for its future research in bone heath.

Conflicts of interest:

There is no conflict of interest.

Acknowledgement

We are thankful to Integral University, Lucknow for providing manuscript number **(IU/R & D / 2021- MCN0001261)** & other resources in completing my paper.

References

[1] Kabeeruddin, M. (2007). Makhzanul Mufradat. (Rep. edition). Idara Kitabus-Shifa, Delhi.
[2] Sun, N., Wu, H., Du, M., Tang, Y., Liu, H., Fu, Y., & Zhu, B. (2016). Food protein-derived calcium chelating peptides: A review. *Trends in Food Science & Technology, 58*, 140–148.
[3] Lee YK, Jung SK, Chang YH, Kwak HS. Highly bioavailable nanocalcium from oyster shell for preventing osteoporosis in rats. Int J Food Sci Nutr. 2017 Dec;68(8):931-940.
[4] Zafar M, Naikodi MA, Nagaiah K, Raju PS. Development of standard operating procedures and quality standard of Kushta Gaodanti with HPTLC fingerprinting and hyphenated techniques. Annals of Phytomedicine. 2020;9(1):66-77.
[5] M. Said (ed). Hamdard Pharmacopeia. Karachi: Hamdard Academy, 1969: 222–234./Said M (1969); *Hamdard Pharmacopoeia of Eastern Medicine*, pp 222-234, Hamdard Foundation, Karachi.
[6] Talha *et al.* Nano-Materials: A Scientific Approach to Validate an Ancient Dosage Form the "Calx (Kushta) in Unani Medicine", 2020, 6(8), 32-37.
[7] Mahmud S. A., Mahdihassan S. Some herbo-metallic preparations or Kushtas of Unani medicine. In: S. Mahdihassan (ed). Bazar Drugs and Folk Medicine in Pakistan. Karachi: Hamdard Foundation Press, 1984,: 90–110.
[8] Mohd Tariq, Khaleequr Rahman, Shahidshah Chaudhary, Mohd Zakir, and Hamid Ali. "Comparative physicochemical evaluation of a herbo-mineral unani formulation: Kushta kharmohra" Int J Green Pharm, vol. 8, no. 3, 2014.
[9] Vohora SB, Khan MSY (1979): *Animal Origin Drugs Used in Unani Medicine*, Institute of History of Medical Research, New Delhi.
[10] Park K, Sadeghi K, Thanakkasaranee S, Park YI, Park J, Nam KH et al. Effects of calcination temperature on morphological and crystallographic properties of oyster shell as biocidal agent. International Journal of Applied Ceramic Technology. 2021 Mar 1;18(2):302-311.
[11] Yoon, G.-L.; Kim, B.-T.; Kim, B.-O.; Han, S.-H. Chemical-mechanical characteristics of crushed oyster-shell.Waste Manag. **2003**, 23, 825–834.
[12] Komiyama, T., Igarashi, S., & Yukawa, Y. (2008). Synthesis of polynuclear complexes with an amino acid or a peptide as a bridging ligand. *Current Chemical Biology, 2*(2), 122–139.
[13] Nomiya, K., & Yokoyama, H. (2002). Synthesis, crystal structures and antimicrobial activities of polymeric silver (I) complexes with three amino-acids [aspartic acid (H 2 asp), glycine (Hgly) and asparagine (Hasn)]. *Journal of the Chemical Society, Dalton, Transactions(12),* 2483–2490.

[14] Lecerf, J. M. *et al.* Effects of two marine dietary supplements with high calcium content on calcium metabolism and biochemical marker of bone resorption. *Eur. J. Clin. Nutr.* **62**, 879–884 (2008).
[15] Flammini, L. *et al.* Hake fish bone as a calcium source for efficient bone mineralization. *Int. J. Food Sci. Nutr.* **67**, 265–273 (2016).
[16] Nielsen, B. D., Cate, R. E. & O Connor-Robison, C. I. A marine mineral supplement alters markers of bone metabolism in yearling arabians. *J. Equine Vet. Sci.* **30**, 419–424 (2010).
[17] Naik Suresh Ramnath, Nazneen Shaikh, Rajesh R. Patil, Rahul S. Somani, Abhijit S. Mali, Protective activity profile of herbomineral medicine in early diabetic nephropathy rats: Restoration of kidney antioxidants, hemodynamics and suppression of proinflammatory mediators, Biomedicine & Aging Pathology, Volume 4, Issue 1, 2014, Pages 33-41.
[18] Parveen H, Eqbal K. Efficacy of some unani formulations in osteoarthritis (Waja-ul-Mafasil): A case series study. N Engl J Med. 2006; 354(8):841.
[19] Frank Chang, Guangchao Li, Maria Haws, Tianhua Niu, Element concentrations in shell of Pinctada margaritifera from French Polynesia and evaluation for using as a food supplement, Food Chemistry, Volume 104, Issue 3, 2007, Pages 1171-1176.
[20] Mohammad, N. I.; Shamsi, S. and Rabee, K. (2016). Comparative elemental analysis of Kushta e Sadaf, a Unani formulation. Int. J. Green Pharm., 10(3):S145.