

A CRITICAL REVIEW ON MANAGEMENT OF OSTEOPOROSIS: AN AYURVEDIC APPROACH

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Article Received on
17 Sept. 2023,

Revised on 07 October 2023,
Accepted on 27 October 2023

DOI: 10.20959/wjpr202319-30081

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ABSTRACT

Introduction: A vital component of the human body, calcium is necessary for strong bones as well as for blood clotting, muscle contraction, maintaining proper heart rhythms, nerve function, and other essential aspects of human physiology. The typical human diet does not contain enough calcium to meet needs due to different physiological and pathological conditions. Therefore, it's crucial to complete the body's demand with various calcium supplements. Physicians should always be aware of the abundant calcium sources that are nearby, as well as their useable form. A compilation of various Ayurvedic calcium-rich sources has done in this article. **Method:** Classical text of *Ayurveda* like *Charak Samhita*, *Rasarnva*, etc. were scrutinised along with original research articles were searched from

Research gate, J-gate, Google Scholar etc to compile more scientific data. **Result:** In the modern age, there are many natural calcium supplements that include the different calcium compounds needed by people and come from different origin sources. Rich calcium supplies can be found in nature, and prior Acharyas have already covered a variety of processing methods to make it the most bio-available for the body to absorb. **Conclusion:** To make it simpler for people to understand this ancient science, it is necessary to understand of the

function of various calcium compounds in the human body, as well as their likely mode of absorption, pharmacokinetics and pharmacodynamics in Ayurveda.

KEYWORDS: Absorption, Calcium, Osteoporosis, *Sudha varga*.

INTRODUCTION

According to *Ayurveda* human body is a equilibrium between *Dosha*, *Dhatu*, and *Mala*. Health is *Dhatu's* ideal state. Any unrest in their balance results in illnesses. This disturbance might either indicate a rise, fall, or departure from their normal habitat. There would be *Asthi dhatu kshaya* in the case of *Asthi kshaya*. *Asthi kshaya* is comparable to osteopenia/osteoporosis in that both conditions result in a reduction in bone tissue mass. Osteopenia refers to a reduction in bone tissue while osteoporosis is defined as ‘a progressive systemic skeletal disease characterised by low bone mass and micro architectural deterioration of bone tissue with a consequent increase in bone fragility and susceptibility to fracture’. Therapeutic utility of calcium is mentioned since *vedic* period (5000 B.C.) in ayurveda text though its discription is scattered in various text. In *Ayurveda*, drugs are classified into three categories depending upon the origin viz *Parthiva Dravyas* i.e, drugs of mineral origin (Table 1), *Jangam Dravyas* i.e, drugs of animal origin (Table 2) and *Audbhid Dravayyas* i.e, drugs of plant origin (Table 3). Calcium rich marine products and minerals have been used since 2500 years. *Sudha Varga* mainly contains calcium rich drugs of mineral origin. *Vaidya Yadavji tikramji* first time categorized calcium rich compounds in a group based on their chemical composition as ‘*Sudha Vijnaneeyam*’ in *Rasamritam* (20th century).^[1]

MATERIAL AND METHODS

Classical text of *Ayurveda* like *Charak Samhita*, *Rasarnva*, *etc.* were scrutinised along with original research articles were searched from Research gate, J-gate, Google Scholar etc to compile more scientific data.

DISCUSSION

Importance of calcium

Calcium is the principal component of human skeleton. It is fifth most abundant element of the human body. About 99% of the body's calcium is stored in bones, rest remaining 1% is found in muscles and other tissues.^[1] Human body works to keep balance in calcium level in the blood and tissues. Human body gets the calcium in two ways, one is by eating calcium rich foods or supplements, and other is by drawing from calcium inside the body. If one does

not take enough calcium containing foods, the body will remove calcium from bones. Calcium that is borrowed from the bones will be replaced at later. But this doesn't always happen just by eating more calcium this leads to development of osteopenia/ osteoporosis. Calcium from foods and dietary supplements is absorbed by both active transport and by passive diffusion across the intestinal mucosa.^[2] Active transport is responsible for most absorption when calcium intakes are lower, and passive diffusion accounts for an increasing proportion of calcium absorption as intakes rise plays an important role in body homeostasis and disturbances in calcium metabolism are associated with derangement of various cellular functions.

Therapeutic indications of calcium

Oral supplements of calcium necessary for growing children, pregnant women, lactating mothers, in individuals which diets deficient in calcium, in patients with post-menopausal osteoporosis, osteoporosis due to cushing's syndrome, in patients on long term corticosteroid therapy, in patients with Vitamin D deficiency, rickets and osteomalacia, who are put on Vitamin D therapy and those Calcium carbonate is used as an antacid. Calcium gluconate or chloride is used intravenously in the acute treatment of tetany. Calcium salts are sometimes used for treating urticaria and non-specific intestinal colic with variable results.

Pharmacological properties of *sudha varga dravyas*

All these drugs are natural calcium compound with different sources in origin, chemically more or less similar and calcium carbonate is the major portion of these substances, even though they differ in their functions and utility. The effects of these drugs vary in the human body. Also their indications are different from each other. These drugs possess *Lekhana*, (Scraping) *Deepana* (Maintains Digestive Fire), *Pachana* (Digestion), *Netraya* (Ophthalmic), *Kriminashaka* (Germicidal), *Jwar-nashaka* (Antipyretic), *Hridya* (Cardio protective), *Amlapitta* (Hyperacidity), *Raktastambhaka* (Hematopoietic), *Shweta Pradara* (Leucorrhoea) properties and useful for females especially after menopause to prevent osteoporosis. *Bhasmas* of these drugs are generally *Katu*, and *Kashay* in *Rasa*, *Snigdha* in *Guna*, *Sheeta Virya* and *Madhur* in *Vipaka*.^[3]

Name of calcium containing drugs in ayurveda

Table 1: Parthiva Dravyas, containing calcium and their respective concentrations.^[4]

Sr. No.	Name of the drug	Common name
1.	<i>Sudha</i>	Lime
2.	<i>Khatika</i>	Chalk
3.	<i>Godanti</i>	Gypsum

Table 2: Jangam dravyas containing calcium and their percentage.^[5]

Sr. No.	Name of the drug	Common name
1.	<i>Sankha</i>	Conch shell
2.	<i>Shambhuka</i>	Snail
3.	<i>Muktasukti</i>	Pearl oyster shell
4.	<i>Kaparda</i>	Cowery shell
5.	<i>Kurma prishta</i>	Turtle shell
6.	<i>Samudra phena</i>	Cuttle fishbone
7.	<i>Pravala</i>	Coral
8.	<i>Mukta</i>	Pearl
9.	<i>Mrigasringa</i>	Deer antlers
10.	<i>Kukkutandatwak Bhasma</i>	Hen's egg shell
11.	<i>Ajasthi</i>	Goat's bone

Table 3: The Audbhida dravyas containing Calcium and Their percentage.^[6- 13]

Sr. No.	Name of the drug	Scientific Name
1.	<i>Asthisamhara</i>	<i>Cissus quadrangularis</i>
2.	<i>Shatavari</i>	<i>Asparagus racemosus</i>
3.	<i>Sigru</i>	<i>Moringa olifera</i>
4.	<i>Tila</i>	<i>Sesamum indicum</i>
5.	<i>Adraka</i>	<i>Zingiber officinale</i>
6.	<i>Haridra</i>	<i>Curcuma longa</i>
7.	<i>Ashwagandha</i>	<i>Withania somnifera</i>
8.	<i>Silajatu</i>	<i>Asphaltum punjabinum</i>
9.	<i>Arjuna</i>	<i>Terminalia arjuna</i>

Elucidation of Ashraya- Ashrayi Bhava in treatment aspect

The importance of treatment is to bring *Dhatu Samyata* and to help maintain the health of a healthy individual and cure the disease of the patient.^[14] *Ashraya-Aashrayi Bhava* helps in planning maintain health, interpreted with *Samanya- Vishesha Sidhhanta*. *Samanya* is the *Vridhi Karana*, *Vishesha* is the *Hrasa Karana*, can be interpreted in *Ashraya-Ashrayi Bhava* like *Ashraya Vardhanam*, *Ashrayi Vardhanam*, and *Kshapanam* both undergo *Kshapanam*, Exception for *Vata* and *Asthi* when *Vardhana* happens then *Asthi Kshapanam* and when *Kshapana*, *Vardhana* happens.^[15] *Santarpana* is the cause of all the *Vridhi* and *Apatarpana* for *Kshaya*. Therefore, in general *Langhana* is the treatment for *Santarpana* and *Brihmana* for *Apatarpana*.^[16]

Probable mode of drug action

These drugs provide more natural and bioavailable form of calcium which is important for good bone mass. On reviewing the concept of *Samanya- Vishesha Sidhhanta*, it is understood that calcium available in the nature is useful therapeutically. Natural calcium got processed under different manufacturing procedures and converted into its most bioavailable form which got easily absorbed in human body and provide necessary therapeutic effects to maintain healthy bones.

CONCLUSION

The latest signs and symptoms of osteopenia/ osteoporosis are almost similar to those of *Asthi kshaya*. Hence, in the present study osteopenia / osteoporosis was vis-à-vis correlated with *Asthi kshaya*. Management of *Asthi kshaya* requires a holistic approach, taking into account the nutritional, metabolic and hormonal aspects, which is fulfilled by *Ayurvedic* drugs. Various clinical trials have proven that *Ayurvedic* herbo-mineral drugs provided significant relief from signs and symptoms of *Asthi kshaya* like *Kati, Asthi and Sandhi shula, Kesha pata, Danta vikara /pata, Nakha vikara* and *Daurbalya*. The antique therapeutic potentials of *Ayurvedic* drugs holds good even today in the management degenerative disorders related to ageing. Going through the above discussion it is clear that calcium is a crucial element of the human body for proper functioning. Natural calcium supplements are abundant in our environment obtained from different origin sources that contain variety of calcium compound and other trace elements also needed for human body. Earlier *Acharyas* have already discussed rich calcium's sources in nature. The natural calcium preparations like *Bhasma* are more effective than synthetic calcium because it contain easily absorbable and assimilable form of oxide and they contain other trace elements such as copper, magnesium, zinc etc. required in trace amount inside the body for proper functioning. Although these all are calcium compound but different drug perform different kind of drug action according to their specific *Rasa, Guna, Virya, Vipaka* and *Prabhav*. *Sudha varga* contains highly therapeutic beneficiary drugs though less data has published and revalidated. It's much needed for further revalidation and publication more data in this regard.

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