Research Article

A STUDY ON *SAMANYAM VRUDDHI KARANAM* WITH REFERENCE TO *MUKTASHUKTI PISHTI* IN *ASTHI KSHAYA*

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ABSTRACT

Asthikshaya is a state where the functional capacity of *Asthi* (bone) is compromised due to the decrease in its *Guna* (properties) *Karma* (function) and structure of *Asthi*. *Asthikshaya* is correlated to osteopenia/ osteoporosis in contemporary science. Osteopenia/osteoporosis is a major global health problem affecting females at an average age of 50 making their bones susceptible to fracture. 1 out of 3 females in India suffer from osteopenia/osteoporosis making it a burning problem in present era. This has led to tremendous interest in Ayurvedic alternatives. Ayurveda states decrease of any entity in the body should be increased by administering similar entity by the means of food or activity. This treatment is based on *Samanya* (similarity) where *Samanya* is the cause for *Vruddhi* (increase in its properties and functional capacity). 30 female subjects between the age of 45 to 65, were included in a single group study by purposive consecutive sampling method, were administered with *Muktashuktipishti* 250mg 2 capsules per day with lukewarm water before food for a period of 2 months. Subjects were assessed pre intervention, during and post intervention. Obtained results were subjected to appropriate statistical analysis to see the significance. By the result it is noted that *Muktashukti* is *Gunasamanya* (*Sthira, Sthula, Katina,* and *Sandragunas*) to *Asthi* thus increases *Asthi* in *Asthikshaya* with improvement in *Kesha* (hair fall), *Nakha* (breakage of nails) *Dantashadana* (loosening of teeth)*, Shrama* (tiredness) and *Asthitoda* (pain in bony area) and statistically significant.

KEYWORDS: *Asthikshaya, Samanya, Vruddhikaranam, Muktashuktipishti*, BMD test.

INTRODUCTION

Asthi is the bone tissue which forms the skeletal framework of the body and supports the body[1]. Compactness of bone tissue is essential for supporting the body by its skeletal framework, transmitting body weight and providing loco motor function. An individual with an excellence of bone tissue is characterized with prominent and well-formed bony parts as well as teeth and nails[2,3]. When bone tissue becomes inferior in excellence, these qualities are compromised[4].

Asthikshaya is understood as decrease in the *Poshakamsha* (nutrient supply) *to Asthidhatu* leading to *Kshaya* of *Asthidhatu* and its functions along with its *Upadhatu* (structures nourished by *Asthi*) and *Mala* (bye products) [5]. As the body is made of *Panchamahabhuta*[6], we understand that *Asthi* is predominant of *Prithvi mahabhuta*[7,8]. In *Asthikshaya* there is quantitative and qualitative decrease of *Prithvimahabhuta* at the level of *Asthi*. The *Dehadharana Shakti* (ability to support body) of *Asthi* is decreased leading to weakness in the bones due to loss of its *Sthira* (sturdy) *Sandra* (rough) *Sthula* (thick) and *Sanghata* (compact) properties[9,10]. *Vatavruddhi* causes *Asthi kshaya*[11,12] and in *Prakopavastha* leading to *Asthi Susheerata*[13] which can be correlated to Osteoporosis which is practically seen in old age[14] and under nourished subjects.

Osteoporosis is a skeletal disorder characterized by compromised bone strength, predisposing bone to an increased risk of fracture. Osteoporosis is the commonest of the metabolic bone diseases and is an important cause of morbidity in elderly subjects[10]. Women over the age of 50 have the greatest risk of developing osteoporosis due to fall in ovarian estrogen production post menopause.1 out of 3 females and 1 out of 8 males in India suffer from osteoporosis, making India one of the largest affected countries in the world. This has led to tremendous interest in the Ayurvedic alternatives.

Samanya and *Vishesha* (dissimilarity) *Siddhanta* (doctrine) is one which forms the basis of all treatments[15]. *Samanya* and *Vishesha* contribute for the increase and decrease of entities on the domains of *Dravya* (physical entity), *Guna* (properties) and *Karma* (action) respectively when applied on human body[16]. The selection of a drug for treatment according to its *Guna* and *karma* is based on the principle of *Samanya* and *Vishesha* and hence is placed first among the *Shad karanas*[14]. This shows the importance of sound knowledge of treatment principle before starting the treatment. Therefore a *Dravya* which can cause *Vruddhi* of *Asthidhatu* based on *Samanya*was evaluated. *Muktashukti* (CaCO$_3$) identified as *Pinctada imbricata fucata*[17] possesses *Katu rasa*, *Madhuravipaka, Snigdhaguna* and *Sheetaveerya* having *Vatapittaghna, Vedanahara, Hridya* property is predominant in *Prithvi mahabhuta*[18-20]. As *Asthi* is predominant in *Prithvimahabhuta*, the drug was intended to cause increase in *Asthi Dhatu* because of its *Samanata* based on *Panchamahabhuta Sanghatana*.

MATERIALS AND METHODS

Source of data

30 female subjects were selected from outpatient department of S.D.M. college of Ayurveda and Hospital, Hassan and Chikamagaluru.

Method of collection of data

- A special proforma was prepared with all points of history taking related to *Asthikshaya*, and symptoms of *Asthikshaya*.
- BMD Test was carried out with a Peripheral Bone Densitometer conducting regular camps at SDM Hospital of Ayurveda, Hassan.

Study design

Selected subjects were included in a single group study by purposive consecutive sampling method. Subjects were assessed pre intervention and on 15th day, 30th day, 45th day and 60th day post intervention.

Diagnostic criteria[21-25]

- Increased hair fall/ thinning of hair
- Easy breakage of nails
- Cracking of teeth
- Falling of teeth
- Tiredness
- Dryness of the body
- Pain in bony area

Such patients were subjected to BMD Test to evaluate *Asthi Susheerata.*

Inclusion criteria

- Female patients above 45 years and below 65 years.
- With Asthi kshaya Lakshana.
- T-Score in DXA Scan below -1.
- Willing to participate in the research.

Exclusion criteria[26]

- History of Hypoparathyroidism /Hyper para-thyroidism.
- History of Hypothyroidism/Hyper thyroidism
- History of Malabsorption syndrome.
- History of Any metabolic bone disease e.g. Paget's disease, Psycho-Neuro-Endocrinal disorder, Rheumatoid arthritis, Osteomalacia, Dysosteo-genisisim perfecta and Marfan's syndrome, Cushing's syndrome.
- History of Chronic liver diseases, Chronic renal failure.
- History of Organ transplantation and evidence of malignancy.
- History of Alcoholics/drug abusers.
- History of CHD or any diagnosed case of Heart Diseases.
- History of Diabetes mellitus
- History of Patient under any drug which is known to affect bone metabolism -calcitonin, Vit. D and corticosteroids for more than 3month.

Investigations

BMD T-Score

Intervention

- **Medicine** : *Muktasukti Pishti*
- Source of Drug: Sri Dharmasthala Manjunatheshwara Pharmacy Udupi.
- **Drug Authentication**: SDMRAAS. Udupi.
- **Contents of the medicine**

Sl.No	Sanskrit Name	Zoological Name	Part Used
1.	*Muktashukti*	*Pinctada imbricata fucata*	Whole pearl oyster

- **Method of preparation:** As stated in AFI Part I, page no 223
- **Packaging and Labeling**

  250mg *Muktashuktipishti* filled in hard gelatin capsule and packed in numbers of 30 in small plastic containers under all aseptic precautions and labelled.
- **Dosage:** 250 mg two capsules twice a day before food.
- *Anupana* :Luke warm water.
- **Duration of medicine :** 2 months

Study duration

8 weeks study duration with a follow up on 15th day, 30th day, 45th day and 60th day.

Assessment criteria

Effect of treatment will be assessed on -

Subjective Criteria

- Increased hair fall/ thinning of hair
- Easy breakage of nails
- Cracks or falling of teeth
- Tiredness
- Dryness of the body
- Pain in bony area

Objective Criteria

- Bone mineral density Test

Statistical analysis

The data collected during the study was tabulated and analyzed with SPSS version 20 by applying following statistical tests. The changes obtained with $P \leq 0.05$ and $P \leq 0.01$ for post hoc test after applying Bonferroni correction was considered statistically significant.

- Cochran Q Test
- McNemar Test
- Friedman's Two Way Analysis of Variance by Rank
- Wilcoxon Signed Rank Test
- Paired T Test

OBSERVATION AND RESULTS

Drop outs - During the course of treatment, the subjects who did not turn up for follow up at given time were dropped out from the study. Total 9 dropouts were there in the present study out of the 30 subjects taken up for research work.

Nakhashadana, Chaladanta and *Rukshanga* had no significant result clinically and statistically hence not discussed here.

Subjective parameters within the group

- ### *Keshashadana* (Shedding excessive hair)

The symptom shedding excessive hair reduced statistically as assessed by Cochran Q and Mc Nemar test. 16 of 21 subjects had this complaint BT out of which 15 subjects got significant reduction in shedding excessive hair (Cochran's Q = 28.444, p =0.000).

- ### *Keshashadana* (Thinning of hair)

The symptom thinning of hair reduced statistically as assessed by Cochran Q and Mc Nemar test. 8 of 21 subjects had this complaint BT out of which 4 subjects got significant reduction in thinning of hair (Cochran's Q = 13.333, p =0.010).

- ### *Keshashadana* (Shedding of hair with root attached)

The symptom shedding of hair with root attached reduced statistically as assessed by Cochran Q and Mc Nemar test. 15 of 21 subjects had this complaint BT out of which 11 subjects got significant reduction in shedding of hair with root attached (Cochran's Q = 30.933, p =0.000).

- ### *Nakhashadana* (Breakage of nails)

There was no statistically significant difference in symptom *Nakhashadana* as assessed by Cochran's Q test p ≤ 0.05, but clinically only one subject had relief from the symptom *Nakhashadana* out of 3 subjects who had this complaint BT.

- ### *Dantashadana* (Loosening of teeth)

There was no statistically significant difference in symptom *Chala danta* as assessed by Cochran's Q test p ≤ 0.05, but clinically both the subjects had relief from the symptom *Chaladanta* who had this complaint BT.

- ### *Dantashadana* (Falling of teeth)

The symptom falling of teeth was not appreciated by subjects in the course of treatment (which was seen earlier) and was statistically significant as assessed by Cochran Q and McNemar test. 3 of 21 subjects had this complaint BT out of which all 3 subjects got significant relief from falling of teeth (Cochran's Q =12.000, p =0.017).

- ### *Daihikashrama* (Physical tiredness)

The symptom *Daihikashrama* reduced statistically as assessed by Cochran Q and McNemar test. 12 of 21 subjects had this complaint BT out of which 10 subjects got significant reduction in *Daihikashrama* (Cochran's Q = 22.143, p =0.000).

- ### *Manasikashrama* (Mental tiredness)

The symptom *Manasikashrama* reduced statistically as assessed by Cochran Q and McNemar test. 7 of 21 subjects had this complaint BT out of which 6 subjects got significant reduction in *Manasikashrama* (Cochran's Q = 12.471, p =0.014).

- ### *Asthitoda* (Pain in bony area)

The symptom *Asthitoda* reduced statistically as assessed by Friedman's and Wilcoxon Signed Rank test. Out of 21 patients 15 patients got significant reduction in *Asthitoda* and in 6 patients there was neither increase nor decrease in pain (x^2= 42.301, p =0.000).

Objective Parameter

- ### BMD t-score

There was no statistically significant difference in BMD T-Score before and after treatment (p ≤ 0.05) as determined by Paired T test but there was difference in Mean (0.1419) in BMD T score before and after treatment with 6.7% of percentage of significance. This difference in mean shows that there was improvement clinically in BMD T-Score in subjects before and after treatment but was not proven statistically.

DISCUSSION

Subjective Parameters

Kesha, *Nakha* and *Danta* are the *Mala* of *Asthi*. The *Panchabhoutik* composition (i.e., *Prithvi*) of *Asthi* can be attributed to *Kesha, Nakha* and *Danta* also, thus during *Kshayaavastha* the decrease of *Sthira*, *Sandra*, *Katina* and *Sthulagunas* of *Prithvi* at the level of *Kesha*, *Nakha* and *Danta* was also observed through the symptoms increased hair fall, thinning of hair and shedding of hair with root attached, loosening of teeth, falling of teeth and breakage of nails. There was significant improvement seen in *Keshashadana nakhashadana* and *Dantashadana* and statistically proven as stated above after administration of *Muktashuktipishti*. We can assume that there is an increase of *Sthira*, *Sandra*, *Katina* and *Sthulaguna* which are nothing but the *Parthivagunas* at the level of *Kesha, Nakha* and *Danta*. We can interpret that, the *Parthivaamsha* of *Muktashuktipishti* is the *Karana* for *Vruddhi* of *Kesha* there by maintaining the thickness of hair and decreasing the hair fall by making the hair roots stronger, strengthening the nail bed and roots of tooth. Nourishment to *Kesha*, *Nakha* and *Danta* is improved only when *Asthi* is in its normalcy. Thus we can conclude *Muktashuktipishti* is *Gunatahasamanya* to *Asthi* and thus leads to *Vruddhi* in *Asthikshaya*.

Shrama and *Asthitoda* is the outcome of decreased functional capacity of *Asthi* which is reflected by decrease in *Bala*, *Sthairya*, *Upachaya* and *Sanghata* function leading to fatigue. There was significant improvement seen in *Shrama* and *Asthitoda* and statistically proven as stated above after administration of *Muktashuktipishti*. We can assume that there is an increase of *Sthira*, *Sandra*, *Katina* and *Sthulaguna* which are nothing but the *Parthivagunas* in the *Asthi*. We can interpret that, the *Parthivaamsha* of *Muktashuktipishti* is the *Karana* for *Vruddhi* of *Parthivaamsha* in *Asthi* leading to increased functional capacity of *Asthi*. Thus we can conclude *Muktashuktipishti* is *Gunatahasamanya* to *Asthi* and thus leads to *Vruddhi* in *Asthikshaya*.

Objective Parameter

- ### BMD t-score

BMD T-Score is the value which indicates the amount of bone tissue in a certain volume of bone. Reduction in BMD T- score (≤ -1) can be related to the structural decrease in *Asthidhatu* leading to a porous bone susceptible to fracture, indicating decrease in *Pruthvi mahabhuta*. Increase in BMD T-Score in 6.7% of subjects

(not statistically significant) indicates the amount of increase in bone tissue in that area, thereby reduction of porosity. As there is no statistically significant *Dravyatahavruddhi* (BMD T-score) seen in subjects, we can interpret that *Dravyasamanya* is not appreciated in *Asthi* statistically but appreciated clinically on administration of *Muktashuktipishti*.

Out of 6 criterias of subjective assessment for which statistics was computed 4 criterias (*Keshashadana*, *Dantashadana*, *Shrama*, *Asthitoda*) were proven to be significant clinically and statistically, 2 criterias (*Nakhashadana*, *Chaladanta*) were clinically significant but not proven statistically. The probable reason for this result was discussed on the basis of *Guna samnanya* of *Muktashuktipishti* and *Asthi*. The objective criteria (BMD T-Score) was clinically significant but not proven statistically. The probable reason for this result was discussed on the basis of *Dravya samnanya* of *Muktashukti pishti* and *Asthi*.

Considering the above results we can interpret that *Muktashukti* is *Gunasamanya* to *Asthi* and thus leads to *Vruddhi* in *Asthikshaya*.

Discussion on mode of action of *Muktashuktipishti*

Muktashukti is the outer hard covering shell of Mukta. This provides *Mukta* protection, nutrition and structural frame for its survival and hence called by the synonyms *Muktagriha*, *Muktamata* and *Mouktikamandira*. *Muktashukti* is obtained from sea hence also called as *Jalashukti*.[27-29] Thus *Prithvi* and *Jalamahabhuta* can be attributed to it.

Muktashuktipishti is having *Katurasa*, *Laghuguna* which can be attributed to *Vayumahabhuta*. Considering the *Karma* - *Vatapittahara*, *Vedanahara*, *Pushtikara*, *Balakaravrishya*, *Chakushya*, *Hridya* and *Vishahara* we can attribute these *karma* to *Madhuravipaka*, *Shitavirya* and *Shitasnigdhaguna* which are the properties of *Prithvi* and *Jalamahabhuta*.

Muktashukti when prepared into *bhasma*, the therapeutic action is potensified. The active ingredients are broken down into smaller particles thus increasing the bioavailability of the drug. Also smaller dosage of the *Bhasma* is potent enough when administered for therapeutic usage than its original form. The time taken for the action of *Bhasma* is lesser than its original form. *Bhavana* with *Nimbuswarasa* increases the metabolism of the drug by its action on *Agni*.

Thus *Muktashuktipishti* having the properties *Katurasa*, *Madhuravipaka*, *Shitavirya*, *Laghusnigdhashitaguna* is considered to be predominant in *Prithvimahabhuta*. On administration of *Muktashukti pishti* 500 mg/day over a period of two months in *Asthikshaya* subjects there was statistically significant improvement seen in subjective assessment criteria. We can assume that there is an increase of *Sthira*, *Sandra*, *Katina* and *Sthulaguna* which are nothing but the *Parthivagunas* in the *Asthi*. We can interpret that, the *Parthivaamsha* of *Muktashuktipishti* is the *Karana* for *Vruddhi* of *Gunasparthivaamsha* in *Asthi* leading to increased functional capacity of *Asthi*. Hence we can understand *Muktashukti* is *Samana Gunabhuyishta* to *Asthi*. Thus we can conclude *Muktashukti*

is *Gunasamanya* to *Asthi* and thus leads to *Vruddhi* in *Asthikshaya*.

Muktashukti is used in Traditional System of Indian Medicine in different forms in various disorders. *Muktashukti Bhasma* is used as an ingredient in preparation of tooth powder. It is used as Calcium supplements in both humans and animals.[30]

CONCLUSION

Samanya is the cause for *Vruddhi* (increase) when applied on the domains of *Dravyaguna* and *karma* as *Aahara* or *Vihara*, but it's not the only cause. *Dravyasamanya* is observed when there is quantitative increase of the biological entity when an exactly similar *Dravya* is administered. *Gunasamanya* is observed when there is increase in properties of the biological entity when *Dravya* with similar properties is administered.

Asthikshaya is understood in terms of decrease either in its *Gunakarma* or decrease in *Asthi* as a *Dravya* (structural decrease). *Kshaya* of *Asthi* is reflected in three ways - through *Vikaras* in its *Upadhatu* and *mala*, through decrease in its functional capacity and through structural decrease. *Keshashadana, Shrama and Asthitoda* are the commonly seen symptoms in *Asthikshaya*. The contemporary parallel term for *Asthikshaya* is osteoporosis, as all the symptoms of *Asthikshaya* is seen in osteoporosis.

Muktashukti is having *Katu rasa, Madhuravipaka, Laghushitasnigdhaguna, Vatapittahara, Vedanahara, Pushtikara, Balakara, Vrishya, Chakushya, Hridya* and *Vishahara* properties. *Muktashukti* is predominant in *Prithvimahabhuta*.

The *Panchamaha bhutasanghatana* and the *Gunas* of *Asthi* can be attributed even to its *Upadhatu* and *mala* also. *Keshashadana, Nakhashadana, Chaladanta and Dantashadana* are the consequence of decrease in *Sthira, Sandra, Kathina* and *Sthula* properties of *Asthi*.

The *Parthivaamsha* of *Muktashuktipishti* is the *Karana* for *Vruddhi* of *Asthi* thus increasing the nourishment to *Keshanakha* and *Danta* there by maintaining the thickness and firmness of the hair nails teeth and making the roots of the hair nails teeth stronger. *Shrama* and *Asthitoda* is the consequence of decreased functional capacity of *Asthi*. The *Parthivaamsha* of *Muktashuktipishti* is the *Karana* for *Vruddhi* of *Asthi* thus increasing *Sthira, Sandra, Kathina* and *Sthula* properties. *Muktashuktipishti* is *Gunasamanya* to *Asthi* hence causes *Vruddhi* of *Asthi* in *Asthikshaya*. *Muktashuktipishti* causes *Vruddhi* of *Asthi* thus proving *Muktashukti* is *Samanya* to *Asthi* and proving *Samanyam Vruddhi Karanam*.

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