

STUDY OF ASTHI W.S.R TO ASTHI-KSHAYA- A REVIEW ARTICLE

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ABSTRACT

Maharshi Sushruta said that *Dhatu* is a pillar of the body. Among seven *Dhatus*, *Asthi Dhatu* is responsible for appropriate posture of body. Bone grew in size during the first two decades of life, with acceleration during adolescence, followed by a period of consolidation. Bone mass subsequently decline with ageing. Now, a day this declination gets accelerated due to changing food-habits, unhealthy diet, increasing stress, excessive smoking & Alcohol and lack of exercises. Even though now people are health conscious and undergoing routine check-ups which include monitoring of blood pressure, sugar, lipid profile, etc. but it miss the tests to assess the health status of bone. So *Asthi-kshaya* (osteoporosis) is often diagnosed at the most devastating stage. Number of researches conducted on the aspect of *Asthi-kshaya* is less while comparing to other disease. On this background, present study was taken to analyze the fundamental concepts of *Asthi-Kshaya* and to find out structural

deterioration of bony tissue leading to *Asthi-kshaya* (osteoporosis) and try to establish a hypothesis regarding how to prevent *Asthi-Kshaya* by means of life Style (*Aahar-Vihar*) changes.

KEYWORDS: *Ayurveda*, *Asthi*, *Asthi-Kshaya*, Osteoporosis.

INTRODUCTION

Ayurveda is the most ancient healthcare system of our country. Ayurvedic science has always emphasized on maintaining the health of a healthy person and curing the disease ones. It is

the science of life and its longevity with the aim of prevention of diseases, rejuvenation of the body improves our life span. According to Ayurveda, bones are much and more important structures of human body, which provide bony framework to our body having different activities. If the bones removed from the body, then the body will remain like a mass which have not able to done any kind of activities like running, walking, jumping, etc. In *Sushruta Samhita*, **Maharshi Sushruta** says, *Dosha*, *Dhatu* and *mala* are the main roots of *sharir*. The function of *Dhatu* is *Dharana* of the *Sharir*. Among the seven *Dhatus*, *Asthi Dhatu* is also with the function of *Sharir Dharana*. It gives shape to the body and protects the vital organs. That means, just As the tree depends on the “*Saara*” within, similarly the human body also based on its “*Asthirupi Saara*”. *Asthi-Kshaya* is a condition in which *Asthi* gets vitiated extremely by the *Vata-Dosha* and changes in its natural phenomena that’s leads to many disorders. Osteoporosis occurs most frequently with increasing age as bony tissues lost progressively. In female the loss of ovarian function at menopause precipitates rapid bone loss. Osteoporosis related fractures are more common among female than male. Presumably due to a lower peak bone mass as well as post menopausal bone loss in female. Nutrition, life style and their hormones play an important role in maintenance of *Asthi Dhatu*, to keep them in natural form and also determine the ideal skeletal mass and density. *Asthi-Kshaya* characterized by structural deterioration of bony tissue, leading to bone fragility and increased risk of fracture of hip, humerus, spine, etc.

MATERIAL AND METHOD

The literary sources for the Present study was collected by Ayurvedic Samhitas like Charaka Samhita, Sushruta Samhita, Astang Sangrah, Sharangdhar Samhita, Chakradatta etc. It will be correlated with the contemporary available books, literature, journals, websites, and research paper as per the need of the study.

LITERATURE REVIEW

Utpatti of *Asthi*

In *Charaka Samhita*, *Bhutagni* has play vital role in the preparation of *Dhatu* these are the five Agni (group of enzymes) such as *Parthivyagni*, *Apyagni*, *Vayavagni*, *Tejasagni* and *Akashagni*, thereafter about transformation (*paka*) of five Categories, *Parthiva Apya*, *Tejasa*, *Vavyiva*, and *Akasiya* attributed (*guna*) of food components respectively. The above five Agni mix with the food components and they get stimulated by *Jatharagini*. These *Bhutagni* while *Paka* (centigrating) the *Mahabhuta* in the food ingredients cause manifestation of their

respective attributes. The five categories of *Mahabhutika* ingredients are reacted upon by their respective and inherent *Agni*, the ultimate products, which come out of this reaction, are the *Visista-Guna* (specific attributes). The five *Mahabhuta* as well as their attributes in the true elements in the body are nourished by the *Panch-Mahabhutagni* and their attributes in the food respectively.

In other words, the *Parthiva* ingredients and respective attributes of the tissue elements of nourish from the *Parthiva* ingredients and their attributes in the food. Nutrient fraction of *Rasa* (plasma) provides nourishment to *Rakta* then that of *Rakta* to *Mansa* (muscle tissue), that of *Mansa* to *Meda* then that to *Meda* to *Asthi* (bone), that of the bone to *Majja* (bone-marrow) and the nutrients part *Majja* provides nourishment to *Shukra*, *Garbha* is the product of nutrient fraction of *Shukra dhatu*.

According to the direction of Ayurveda all things creatures and even humankind are made of five elements these are the *Panch-Mahabhuta*. The structure of bone is also made according to *Panch Mahabhuta* and it is called their *Panch Bhautic Sanghatan*. In this process formation of various *Dhatu* from *Rasa Dhatu* when *Medo Dhatu* is acted upon by its own *Agni* at that time with the help of *Prithvi*, *Agni* and *Vayu* it becomes *khar*. This *kharibhoot Medo Dhatu* is called as *Asthi*.

In *Sushruta Samhita*, Formation of *Asthi Dhatu* described same as *Charaka Samhita*. **In *Astanga Hridaya***, Formation of *Asthi Dhatu* described same as *Sushruta Samhit*, Due to the compactness of *Meda*, the atoms often take on a hard, hard form of *Asthi* form, after the flesh, the evolution of the evolved creation takes place in the *Asthi* form.

In the evolutionary sequence of the body, the appearance of the form in the first flesh takes place in the infinite *Asthi* form, but the bone is considered to be the complete stage of evolution. After the *Asthi*, there is no appearance of wealth and form, both *Majja* and *Shukra* are liquid forms, although *Shukra* is the producer of the other body, but itself remains intangible latent.

The process of formation of *Asthi Dhatu*, the process of origin can be done more clearly by *Bhutaagni Pak*, *Dhatvagnipak* process of food digestion.

Karma of Asthi

In *Sushruta samhita* said that function of *Asthi* is *Deha Dharan* and *Majja Pusti*. Maharshi *Sushruta* said that the name of the third *Kala* is *Medodhara Kala*. This *Meda*, which is found in the abdomen in all living beings, reaches the small bones and the gross bones and becomes *Majja*, especially the *Majja* is found in the gross bones, but apart from them in all the small bones, it is called *Sarakta Meda*. *Acharya Vagbhata* has also described the *Dharan Karma* of bone. *Acharya Sharangadhara* has called the teeth the *Updhatu* of the *Asthi* and thus maintains or nourishment of the *Asthi*. It is also said to be the *karma* of the *Asthi*. Other *Acharyas*, this opinion of *Sharangadhara* has been enumerated, because the *Purvacharyas* have considered the teeth in a special type of *Asthi* only in '*Ruchak*'. whereas *Shangadhara* has taken a new step of considering the teeth as a separate *Updhatu* from the *Asthi*.

Nidan of Asthi kshaya

In *Charaka Samhita*, The provocation of *Vata* is due to diminution of body elements or due to obstruction to its normal circulation caused by occlusion in the body channels. When the *Vata* is provoked, it agitates the other two humors and throwing them about here and there, causes occlusion of the body-channels, there by producing disorders. It also leads to the diminution of the body nutrient fluid and other body elements. Excessive exercise, fasting, anxiety, rough, little, and measured diet, exposure to sunlight, fear, grief, *Ruksha Pan*, *Prajagar*, excessive discharge of *Kapha*, *Rakta*, *Sukra* and other excrete, time-factors (old age and receiving seasons) and injury by organism these are the cause of *Kshaya*.

In Astanga Hridaya

Function of *Agni*- The parts of *Jatharagni* (digestive fire) present at their own places live in all tissue also. Their increase or decrease results in increase or decrease of tissues respectively. The increase or decrease of preceding tissue results in increase or decrease of succeeding tissue.

In this reference one could remember the sentences said by *Acharya Chakrapani* on *Charaka Chikitsa* 15/16- according to him *Aahara Rasa* nourishes all the tissues. This nourishment occurs gradually. The useful part of food is *Rasa Dhātu* and has two features-permanent and nourishes. The permanent one increases *Rasa Dhātu* and performs its own functions, while the nourishes one contain parts of *Rakta* in it and forms *Rakta Dhātu* when *Dhatavagni* of *Rakta* metabolizes it.

That *Rakta Dhatu* have two features in it i.e. permanent and nourishes permanent one nourishes own itself and nourishes one provides nourishment to succeeding *Dhatu*. Similar phenomenon occurs in all *Dhatu*. Both *Acharya Vagbhatt* and *Acharya Charak* mean to say that *Dhatwagni* is responsible for increase or decrease of other *Agni*.

Ashraya- Ashrayi Bhavas of Dosas

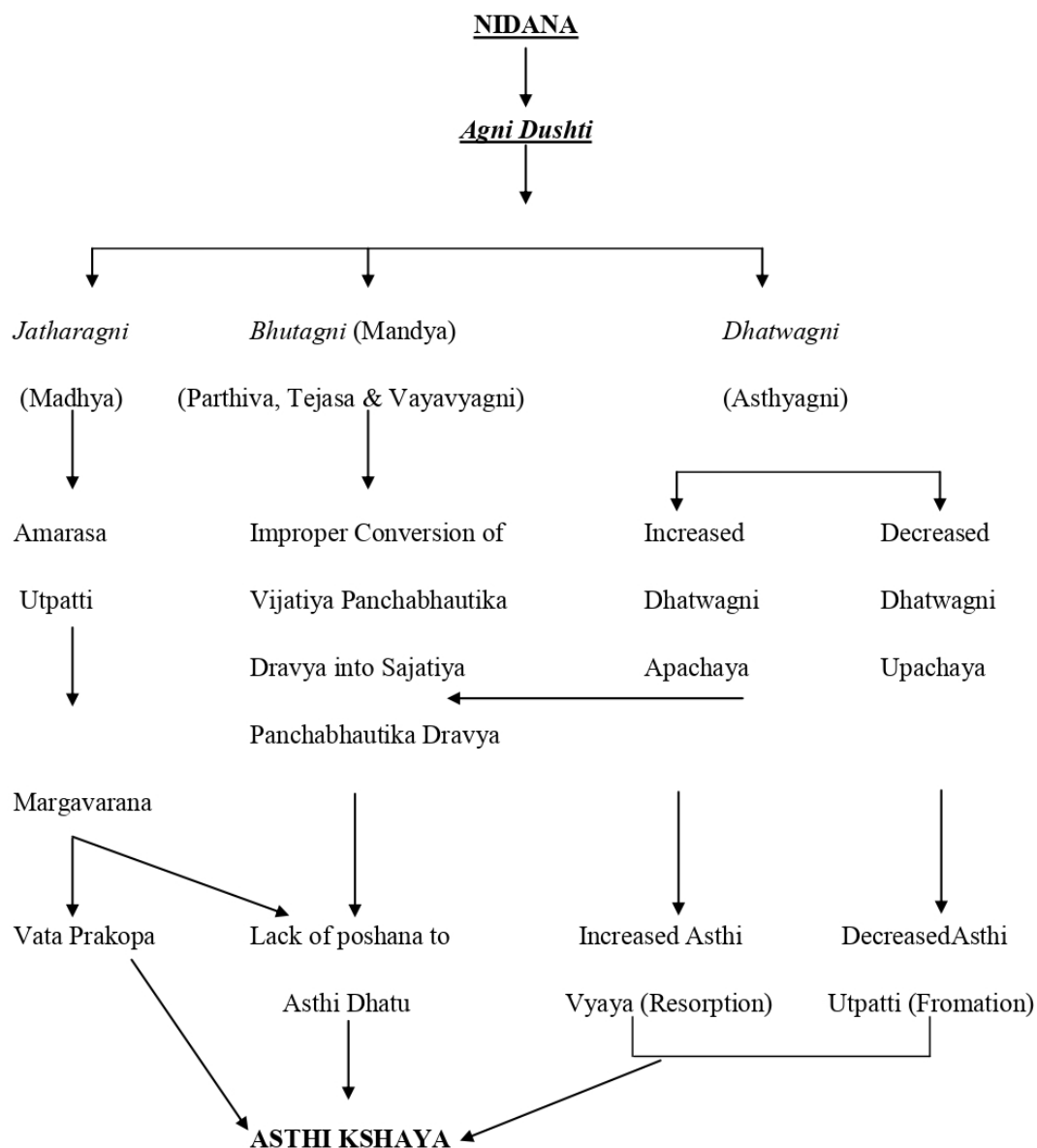
The *Vata* resides in *Asthi* (bone), *Pitta* resides in *Sweda* and *Rakta* (Sweat and blood) and *Kapha* resides in remaining *Dhatu* (tissue) i.e. (*Rasa*- tissue which is liquid and circulatory, *Mamsa*-muscles, *Majja*-marrow, *Sukra*-semen, *Mutra*-urine, *Purisa*-faces. Therefore they have *Ashraya-Ashrayi Bhava* (residence and resident or content feature) due to this features the drug that increases its content i.e. *Ashrayi*, similarly if one decreases then other also decreases. But there is one exception in case of *Asthi* (bone) and *Vata* (air). Generally *Tarpana* (satiating by food) leads to growth occurring in body and this growth is *Kapha* while *Apatarpana* (un-satiating) produces emaciation and is caused by *Vata*, hence the disorders arises due to increases or decreased should be treated soon by *Langhana* (fasting) and *Brihana* (nourishing) therapies.

Jyotsna Commentary

Dosha Dhatu and *Mala* are intimately related to each other. There *Dosha* are *Ashrayi* that reside in *Dhatu* and *Malas*. *Dosha* exist in whole body but present especially at some particular places or their seats, hence anyhow increases or decreases in *Ashraya* (residence) too leads to increase or decrease of *Ashrayi* i.e. *Dosha* both effect each other and it is known as *Ashraya-Ashrayi Bhava*.

Therefore similar drugs are used to increases or decrease them. The *Acharya* explains the principal that *Santarpana* (nourishment by food or therapies) and to growth where as *Aapatarpana* (fasting) cause emaciation .Therefore to decreases or increases the drugs and therapies should be administered properly according to this principal.

This *Ashraya-Ashrayi Bhava* does not apply in case of *Asthi* and *Vata* to it is an exception to this.



LAKSHANA OF ASTHI KSHAYA

S.NO.	LAKSHAN	Charak	Su.	A.S.	A.H
1.	Asthi Toda	-	+	+	+
2.	Asthi Shool	+			-
3.	Kesa Vikara and Paata	+		+	+
4.	Loma Vikara and Paata	+		+	+
5.	Nakha Vikara and Paata	+		+	+
6.	Samshru Vikara and Paata	+			-
7.	Danta Vikara and Paata	+	+	+	+
8.	Sandhi Saithilya	+		+	-
9.	Rukshata	-		+	-
10.	Parushya	-	-	+	-
11.	Asthi Baddha	-	-	+	-
12.	Mamsabhilasha	-	-	+	-
13.	Ati Manda Chesta	-	-	-	-

16	Bala Kshaya	-	+	+	+
17	Meda Kshaya	+	-	-	-

Factors affecting bone growth and bone remodelling

Normal bone metabolism growth in the young and bone remodeling in the adult depends on several factors. These include adequate dietary intake of minerals and vitamins, as well as sufficient levels of several hormones.

1. Minerals: Large amounts of calcium and phosphorus are needed while bones are growing, as are smaller amounts of magnesium, fluoride, and manganese. These minerals are also necessary during bone remodeling.

2. Vitamins: Vitamin A stimulates activity of osteoblasts. Vitamin C is needed for synthesis of collagen, the main bone protein. Vitamin D helps build bone by increasing the absorption of calcium from foods in the gastrointestinal tract into the blood. Vitamins K and B12 are also needed for synthesis of bone proteins.

3. Hormones: During childhood, the hormones most important to bone growth are the insulin like growth factors (IGFs), which are produced by the liver and bone tissue. IGFs stimulate osteoblasts, promote cell division at the epiphyseal plate and in the periosteum, and enhance synthesis of the proteins needed to build new bone. IGFs are produced in response to the secretion of human growth hormone (hGH) from the anterior lobe of the pituitary gland. Thyroid hormones (T3 and T4) from the thyroid gland also promote bone growth by stimulating osteoblasts.

In addition, the hormone insulin from the pancreas promotes bone growth by increasing the synthesis of bone proteins.

At puberty, the secretion of hormones known as sex hormones causes a dramatic effect on bone growth. The sex hormones include estrogens (produced by the ovaries) and androgens such as testosterone (produced by the testes). Although females have much higher levels of estrogens and males have higher levels of androgens, females also have low levels of androgens, and males have low levels of estrogens.

The adrenal glands of both sexes produce androgens, and other tissues, such as adipose tissue, can convert androgens to estrogens. These hormones are responsible for increased osteoblast activity and synthesis of bone extracellular matrix and the sudden “growth spurt” that occurs during the teenage years.

The Estrogens also promote changes in the skeleton that are typical of females, such as widening of the pelvis. Ultimately sex hormones, especially estrogens in both sexes, shut down growth at epiphyseal (growth) plates, causing elongation of the bones to cease. Lengthwise growth of bones typically ends earlier in females than in males due to their higher levels of estrogens.

During adulthood, sex hormones contribute to bone remodeling by slowing resorption of old bone and promoting deposition of new bone. One way that estrogens slow resorption is by promoting apoptosis (programmed death) of osteoclasts.

Parathyroid hormone, calcitriol (the active form of vitamin D), and calcitonin are other hormones that can affect bone remodeling. Moderate weight-bearing exercises maintain sufficient strain on bones to increase and maintain their density.

DISCUSSION

The term *Asthi Kshaya* itself denotes that it is formed from two words *Asthi* and *Kshaya* meaning the depletion of the *Asthi Dhātu*. In modern science the term Osteoporosis is derived from Osteon and Porosis a Greek and Latin word respectively meaning bone tissue and full of pores, respectively. Hence the condition *Asthi Kshaya* may be co-related with osteoporosis of the modern science. **Panch Bhoutikatva of Asthi** According to Acharya Charaka opines that *Asthi Dhātu* is a predominance of *Prithvi Mahabhūta* along with *Agni* and *Vāyu Mahabhūta*. According to *Maharshi Sushruta* *Prithvi*, *Vāyu Mahabhūta* are responsible for *Asthi* formation.

On the other hand in *Astanga Hridaya* mentioned that *Asthi* is mainly from by *Prithavi Mahabhūta*. With the self realization of the *Akasha* and the *Vāyu* from the *Akasha*, from *Vāyu*, *Agni*, *Agni* from *Jala*, and from *Jala* the *Prithvi Mahabhūta* is origin. According to the principal of *Aanyonyaanupravista*, the *Guna* of *Mahabhūtas* are gradually present in their successive *Mahabhūtas*. Thus the *Prithvi* being the last (fifth) *Mahabhūta*, it is also has the *Guna* of all the former *Mahabhūtas*. The *Pancha Bhoutikatva* of the *Asthi* can be proved in the following way. The *Asthi Dhātu* is mainly predominant with *Prithvi*, *Agni* and *Vāyu Mahabhūtas*. *Agni* is responsible for the *Paka karma* of *Asthi Dhātu* and provides shape of the *Asthi*. Due to *Vāyu*, development, growth and regeneration properties of bones are seen. Due to *Jala Mahabhūta* resilience of bones occurs, while their porous and spongy form and vascular canal and haversian system are developed by *Akasha Mahabhūta*, and compact

portion of bone hardness is due to *Prithvi Mahabhuta*. Although bones are made by all the five *Mahabhutas*, *Prithvi* and *Vayu* are the two prominent *Mahabhuta*'s in its composition causing the compactness (hardness) and growth and remodeling of bones.

Nidana of Asthi-Kshaya, In *Charaka Samhita* and *Astanga Hridaya Samhita* there is no direct mentioning about the *Asthi Kshaya* Nidana or the factors that cause *Asthi Kshaya*. According to *Acharya Charaka*, Excessive exercise, fasting, anxiety, rough, little, and measured diet, etc. these are the cause of *Kshaya*. On the other hand *Acharya Vagbhata* describe the relationship between *Asthi Dhatu* and *Vata Dosha* through *Ashraya- Ashrayi Bhava*. According to this when *Vata increases*, *Asthi -Kshaya* occurs and vice versa. So keeping this particular factor in mind we can say that the Nidanas or the etiological factors responsible for the increase of *Vata Dosha* is responsible for the *Asthi Kshaya*. Apart from this, factors like *Manasika Nidanas*, *Shroto Dushti Nidanas*, *Agni Mandya*, *Jaravasta* responsible for *Asthi Kshaya*. *Asthi Kshaya* usually occurs in old age, when there is a predominance of the *Vata Dosha*.

Lakshan of Asthi-Kshaya, As we have discussed *Asthi Kshaya* is a disease caused by the increased *Vata*. It is a general rule that the *Purva Rupa* are in unmanifested (*Avyakta*) stage in any *Vata Vyadhi*. In the initial stage of the disease the mild symptoms can be taken as the premonitory symptoms of *Asthi Kshaya* like dull aching in the bones, joints, and mildness of other symptoms etc. can be considered as the premonitory symptoms of *Asthi Kshaya*. Osteoporosis is totally asymptomatic in the initial stage, because low bone mass itself doesn't cause any symptoms and it is called as the "silent thief".

Symptomatology: Pain in the bones and joints is the main symptom of *Asthi Kshaya*. Generally, when *Dhatu* is affected its *Upadhatu* and *Mala* is also affected; hence dental deformity/fall, falling of; hair, body hair, moustache and nail deformity are seen in *Asthi Kshaya*. Teeth are considered as *upadhatu*s of *Asthi* by *Sharangdhara*. The other symptoms seen in *Asthi Kshaya* are either due to the anatomical or physiological alteration of the *Asthi Dhatu* and its waste products.

CONCLUSION

As we have discussed *Asthi-Kshaya* is a disease caused by the increased *Vata*. It is a general rule that the *Purva Rupa* are in unmanifested (*Avyakta*) stage in any *Vata Vyadhi*. In the initial stage of the disease the mild symptoms can be taken as the premonitory symptoms of

Asthi Kshaya like dull aching in the bones, joints, and mildness of other symptoms etc. can be considered as the premonitory symptoms of *Asthi Kshaya*.

Asthi-Kshaya is diminution of *Asthi Dhatu*. *Kshaya* (diminution) of the *Asthi Dhatu*, which may be co-related with the osteoporosis in modern science.

The other symptoms seen in *Asthi-Kshaya* are either due to the anatomical or physiological alteration of the *Asthi Dhatu* and its waste products. Recent advances in the study of Osteoporosis have shown that the deformity in the nail and teeth is a definite indicative of risk of Osteoporosis.

In modern science the risk factors and etiological factors of Osteoporosis are as follows, Advanced age, low body mass index (BMI) <19, female gender, menopause, low calcium diet, magnesium and vitamin D deficiency, smoking or tobacco in any form, alcoholism, lack of exercise, Sedentary life style etc. In *Ayurvedic* classics, keeping in mind all the etiological factors explained under *Vata Vyadhi*. Even though factors responsible for increase in *Vata* are the main factors in the manifestation of *Asthi-Kshaya*. *Dhatu Kshaya* and *Marga Avarana* are the causative factors for aggravation of *Vata*. Thus, there is no single pathogenesis mechanism leading to *Asthi-Kshaya*. *Asthi-Kshaya* is therefore a complex mechanism. Increase in *Vata* leads to decrease in *Asthi*. According to *Aashraya Ashrayi Bhava*, *Asthi Dhatu* and *Vata Dosha* are inversely proportional to each other regarding *Vridhhi* and *Kshaya*, i.e. when *Vata Vridhhi* takes place *Asthi-Kshaya* occurs.

Prevention is better than cure it is the basic concept of Ayurveda. From the above research work we may predict that the *Lakshana* of *Asthi-Kshaya* of a person and the diseases in his further life. So from this we may advice the person to follow *Dincharaya* and *Ritucharya* and we may reduce his upcoming diseases. *Dincharaya* (daily regimen) and *Ritucharya* (seasonal regimen) have been mentioned in the classics of Ayurveda. *Dincharaya* and *Ritucharya* are one of the main tools for maintain and promotion of health. Thus implementation of *Dincharaya* and *Ritucharya* has great effect in the prevention of disease.

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