

॥ श्री धन्वन्तरये नमः ॥



शंखचक्रं जलौकादधत्तमृतघटम् चारुदोऽग्निश्चतुर्भिः ।  
सूक्ष्मं स्वच्छातिहृदयार्कपरिविलसत् मौलिमंभोजनेलम् ॥  
कालाम्भोदोऽम्भलांगम् कटितटविलसन्चारुपीताम्बराढ्यम्  
वन्दे धन्वंतरिं तं त्रिखिलगदवनप्रौढदावाम्बिलीलम् ॥



**“EVALUATION OF THE RASĀYANA EFFECT OF KRUṢṢṢA  
TILA (*SEMEN SESAMI NIGRUM*) – A CLINICAL STUDY”**

A THESIS SUBMITTED TO  
BHARATI VIDYAPEETH UNIVERSITY, PUNE  
FOR AWARD OF DEGREE OF  
DOCTOR OF PHILOSOPHY IN SWASTHAVRITTA  
UNDER THE FACULTY OF AYURVED

SUBMITTED BY  
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**February 2016**

## **CERTIFICATE**

This is to certify that the work incorporated in the thesis entitled “Evaluation of the Rasāyana effect of Kruṣṇa Tila (*semen sesami nigrum*) – A Clinical Study” for the degree of ‘Doctor of Philosophy’ in the subject of SWASTHAVRITTA under the faculty of AYURVED has been carried out by Dr Arora Manish Tirthram in the Department of swasthavritta at Bharati Vidyapeeth Deemed University, College of Ayurved, Pune during the period from November 2012 to February 2016 under the guidance of Dr R. P. Patwardhan

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## **CERTIFICATION OF GUIDE**

This is to certify that the work incorporated in the thesis entitled “Evaluation of the Rasāyana effect of Kruṣṇa Tila (*semen sesami nigrum*) – A Clinical Study” Submitted by Dr Arora Manish Tirthram for the degree of ‘Doctor of Philosophy’ in the subject of Swasthavritta under the faculty of Ayurved has been carried out in the Department of Swasthavritta, Bharati Vidyapeeth’s college of Ayurved, Pune during the period from November 2012 to February 2016 under my direct supervision/ guidance.

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I hereby declare that the thesis entitled “Evaluation of the Rasāyana effect of Kruṣṇa Tila (*semen sesami nigrum*) – A Clinical Study” submitted by me to the Bharati Vidyapeeth University, Pune for the degree of **Doctor of Philosophy (Ph.D.)** in Swasthavritta under the faculty of Ayurved is original piece of work carried out by me under the supervision of Dr R P Patwardhan. I further declare that it has not been submitted to this or any other university or Institution for the award of any degree or Diploma.

I also confirm that all the material which I have borrowed from other sources and incorporated in this thesis is duly acknowledged. If any material is not duly acknowledged and found incorporated in this thesis, it is entirely my responsibility. I am fully aware of the implications of any such act which might have been committed by me advertently or inadvertently.

Place :

Date :

Dr Arora Manish T

**ACKNOWLEDGEMENT**

I offer my salutation to Lord Dhanvantari with whose showering of blessings this task was ventured without any hindrances.

On this solemn occasion of successful accomplishment of my work, my reverence and deep sense of gratification is due for my beloved father Late Mr. Tirthram Arora. I also express my gratitude towards my mother Mrs. Laxmi Devi Arora, who the architects of my career. The perseverance, discipline and culture, which I could imbibe, is solely because of their painstaking upbringing and strong moral support

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**Dr. Arora Manish**

**ABBREVIATIONS**

A.H.	-	Ashtanga Hridaya
A.S.	-	Ashtanga Sangraha
Bh.Pr.	-	Bhavaprakasha
B.R.	-	Bhaishajya Ratnavali
Bh.S.	-	Bhela Samhita
C.S.	-	Charaka Samhita
Chi.	-	Chikitsa
C.P.	-	Chakrapani
Dal.	-	Dalhana
Dal.T.	-	Dalhana Tika
Eng.	-	English
K.S.	-	Kashyapa Samhita
Ma.Ni.	-	Madhava Nidana
Ni.	-	Nidana
San.	-	Sanskrit
Sh.S.	-	Sharangadhara Samhita
S.S. /Su.S	-	Sushruta Samhita
Su.	-	Sutra
V./ Vi.	-	Vimana
Y.R.	-	Yogaratanakara



**Other**

Dr.	Doctor
Prof.	Professor
P.G.	Post Graduation
i.e.	That is
Dept.	Department
Pb.	Publication
Ref.	Reference

**In Tables**

Veg.	Vegetarian
B.T.	Before Treatment
A.T.	After Treatment
S.No. / S.N.	Serial Number
0,1,2,3	Grades of severity.
z	Test of significance
p	Probability
S.D.	Standard Deviation
S.E.	Standard Error
dif.	Difference
acc.	According

**Symbols used**

+	Present
-	Absent
%	Present
<	Smaller than
>	Greater than

SYSTEM OF TRANSCRIPTION

अ = a	घ = gha	ध = dha	आ = a
ङ = ṅa	न = na	इ = i	च = ca
प = pa	ई = i	छ = cha	फ = pha
उ = u	ज = ja	ब = ba	ऊ = u
झ = jha	भ = bha	ए = e	ञ = ñ
म = ma	ऐ = ai	ट = ṭa	य = ya
ओ = o	ठ = ṭha	र = ra	औ = au
ड = ḍa	व = va	अं = aṁ	ढ = ḍha
श = sa	अः = h	ण = ṇa	ष = ṣa
क = ka	त = ta	स = sa	ख = kha
थ = tha	ह = ha	ग = ga	द = da
श्र = sra	क्ष = kṣa	त्र = tra	ऋ = ṛ

**ABSTRACT**

“Evaluation of the Rasāyana effect of Kruṣṇa Tila (*semen sesami nigrum*) –  
A Clinical Study”

**Keywords:** - Rasāyana, Kruṣṇa tila, black sesame

**Introduction**

Based on 2001 census, approximately 163 million Indians are above the age of 50; this number is expected to increase to 230 million by 2015. Increased sedentary lifestyle, over stress, faulty diets etc. has all lead to low Dhatu bala, low Ojas, vitiation of all Doshas; resulting in premature aging, fatigue, debility, inability to adopt to stress, recurrent illness and depression.

The developed countries like US, Europe and Japan have registered high rate of population-aging with significant negative impact on socio-economic and health-care planning.

Among the eight branches of Ayurveda, Rasāyana Tantra holds an important place. In Ayurveda, the method of maintaining & promotion of positive health has been described i.e. Rasāyana which literally means rejuvenation therapy.

In Vagbhata Samhita use of Kruṣṇa Tila has been indicated for the purpose of Rasāyana. Kruṣṇa Tila is easily available, cheap & one of the common food substance.

**Aim:**

1. Study the Rasāyana effect of Kruṣṇa Tila in improving the health status.

**Objectives:**

1. Study in detail about Kruṣṇa tila.
2. Study the commonly occurring minor complaints of health and early ageing.
3. Understanding the concept of Rasāyana therapy and its practical utility to maintain and improve health status.

### **Methodology**

A clinical study with pre-test and post-test design where in 100 patients fulfilling the inclusion criteria of either sex between the age group of 40 to 60 years were selected from OPD of BVMF's Ayurveda Hospital, Pune-43. Patients were advised Kruṣṇa tila 10 gram once daily to be chewed at Rasāyana kala (Morning) empty stomach with sheeta jala for a total duration of 90 days. On 15<sup>th</sup>, 30<sup>th</sup>, 60<sup>th</sup>, 90<sup>th</sup> day the follow up were taken. The parameters included for assessment were weight, quetelet's index, muscle index, lorenz's constitutional index, abhyavaharan Shakti, jarana Shakti, twak parushata, nidra, khalitya, slatha sandhi, slatha mamsa,

### **Results and Discussion**

The observations revealed significant relief in symptoms of Abhyavaharan Shakti (64.12 %), Jarana shakti (68.42 %), twak parushta (61.52 %), khalitya (70.83 %). Similarly significant relief was recorded in symptoms of Slatha asthi (61.54 %), Slatha sandhi (52.27 %).

Kruṣṇa tila having properties of snigdha, sukshma guna, katu, tikta rasa and ushna virya, Twakprasada, pacifying vata dosha may have helped in relieving these symptoms.

In relation to the observations of *quetelet's index*, *muscle index* and *lorenz's constitutional index*, the results did not show any significant changes in them.

### **Conclusion**

Majority of patients i.e. 68 patients were in age group of 40-50 years and 54 patients were having vata dominant prakruti or vata associated prakruti, which highlights the occurrence of early ageing signs in the population and vata being important dosha involved, as truly stated in samhita's about vata predominance in later ages of life. Black sesame seeds are high in calcium, iron, copper, magnesium, phosphorus, vitamin B etc. These minerals help to support healthy bones, muscles,

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blood, and nervous system. Copper strengthens blood vessels, joints, and bones. It is assumed that Rasāyana drugs act with predominance effect at different levels like Agni, Dhatu and Srotas. The Rasāyana effect of Kruṣṇa tila can be seen at the agni level i.e. katu, tikta rasa and ushna virya helps in improvement of agni (digestion & metabolism), sukshma and yogvahi gunas of Kruṣṇa tila helps supply of various micro nutrients like zinc, calcium, magnesium, vitamin E, lignans (antioxidants) etc. to each and every cell of the body thereby improving the nourishment of the body at micro level & overcoming the early signs of ageing, justifying the mode of action of Rasāyana dravyas.

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# INTRODUCTION

## INTRODUCTION

Achieving and maintaining health is an ongoing process, formed by both the evolution of health care knowledge and practices as well as personal strategies and organized interventions for staying healthy.

*“Invest in health and build safer future”* - slogan of W.H.O. for the year-2007, highlights the significance of prevention of diseases and promotion of health. Health and health related issues have been at center stage with respect to protection of one self from diseased conditions. There are various health issues common with many people across the globe. Disease is one of the most common health concerns. According to *GlobalIssues.org*, approximately 36 million people die each year from non-communicable (not contagious) disease including cardiovascular disease cancer, diabetes, and chronic lung disease. All the health sectors are giving due importance to ideal life style and proper diet.

Based on 2001 census, approximately 163 million Indians are above the age of 50; this number is expected to increase to 230 million by 2015. Even conservative estimates suggest that of these, 20 per cent of women and about 10-15 per cent of men would be osteoporotic.

Increased sedentary lifestyle, over stress, faulty diets- using fast food items etc. irregular timings of meal due to change in the duties and more and more people are using stale foods with preservatives, addiction etc. has all lead to low Dhātu bala, low Ojas, vitiation of all Doṣas; resulting in – premature aging, fatigue, debility, inability to adopt to stress, recurrent illness and depression.

Widely regarded as the oldest form of healthcare in the world, Āyurveda is an intricate medical science that exists in India since thousands of years. Āyurveda aims at prevention & promoting health of healthy, if diseased to heal.

Āyurveda is a Sanskrit word that literally translates as “the wisdom of life” or “the knowledge of longevity”. In accordance with this definition, Ayurvedic medicine views health as much more than the absence of disease. The wise seers and sages of the time, intuitively understanding the physiology and workings of the mind-body-spirit long before, explained the basic principles of Āyurveda. Āyurveda is divided into eight branches, which are collectively called as Aṣṭāṅga Āyurveda. Rasāyana Cikitsā (Rejuvenation therapy) is the branch of Ayurvedic science, which deals with various aspects of preventive health care. In Āyurveda, among various important aspects of preservation of health have been described i.e. Rasāyana.

The aim of Āyurveda is to prevent illness, heal the diseased and preserve life. This can be summed up as follows: <sup>1</sup>

- To protect health and prolong life ("Swasthyas swasthya rakshanam")
- To eliminate diseases and dysfunctions of the body ("Aturasya vikar prashamanamcha")

Among the eight branches of Āyurveda, Rasāyana Tantra holds an important place. In Āyurveda, the method of maintaining & promotion of health are described i.e. Rasāyana.

Rasāyana Tantra, as the name suggests describes the methods of withdrawing ageing, increasing lifespan, intelligence, strength and capacity to get rid of diseases. Rasāyana is that by which one attains the excellence of all Dhātus.

The term Rasāyana is formed by two words Rasa + Ayana. The measures by which a person achieves the excellence of Rasa Dhatu (Rasa the is nourishing substance which is produced during digestion) and the proper nourishment of Śārīra by it, is known as Rasāyana (rejuvenation therapy). The Rasāyana includes various herbs, diet and daily regimens (routines) which promote longevity by delaying aging and preventing diseases.

Bhāvaprakāśa defines Rasāyana as a measure which helps to delay aging and prevent disease.<sup>2</sup>

A persons undergoing rejuvenation therapy attains longevity, memory, intellect, freedom from disease, youth, excellence of lusture, complexion, voice, excellent potentialities of the body and sense organs, respect and brilliance.

Rasāyana Cikitsā literally means rejuvenation therapy. Rejuvenation is to return to youthful state or to the normal physiological condition from ill health. Entire human race has been desiring for a healthy & disease free longevity from time immortal for which Rasāyana seems to be an appropriate solutions when followed by an healthy individual i.e. Swastha purusha (Healthy Individual) as per the descriptions quoted in Ayurvedic classics.

In Vāgbhata Saṁhitā (Aṣṭāṅga Saṁgraha & Aṣṭāṅga Hṛdaya) Various Rasāyana Dravyas have been mentioned. Use of Kruṣṇa Tila has been indicated in both above mentioned Saṁhitā's for the purpose of Rasāyana. Kruṣṇa Tila is easy available, cheap & one of the common food substance.

Hence an attempt was made to understand the role of Kruṣṇa Tila as Rasāyana in improving the health status.

## **AIM & OBJECTIVES**

### **Aim:**

1. Study the Rasayana effect of Krushna Tila in improving the health status.

### **Objectives:**

1. Study in detail about Krushna tila.
2. Study the commonly occurring minor complaints of health and early ageing.
3. Understanding the concept of Rasayana therapy and its practical utility to maintain and improve health status.

## **HYPOTHESIS**

H<sub>0</sub>:- There is no significant effect of Krushna Tila as Rasayana

H<sub>1</sub>:- There is significant effect of Krushna Tila as Rasayana

# LITERARY REVIEW

## RASĀYANA

Every human beings wishes to attain long & healthy life without any ailments and to have shatayusha i.e. to live for more than hundred years. Vedas have dealt with the problems of aging and its delaying. “Jivema Sharadah Shatam” (Rigveda 10/39/8)

Āyurveda is divided into eight branches, which are collectively called as Aṣṭāṅga Āyurveda. Rasāyana Cikitsā (Rejuvenation therapy) is the branch of Ayurvedic science, which deals with various aspects of preventive health care. Rasāyana Cikitsā plays an important role in promotion of health & prevention of disease

Rasāyana Cikitsā (*Rejuvenation* therapy) is the branch of Ayurvedic science, which deals with various aspects of preventive health care which aims at achieving a long and healthy life. To improve quality and quantum of life ‘Rasāyana’ has been explained in Āyurveda. Rasāyana is indicated in the healthy individuals as well as in diseased state.

Rasāyana Cikitsā is a specific method of treatment which has direct effect on the basic aspect of the body i.e. Agni, Srotas and Dhātu's. Rasāyana increases strength of body tissues, builds up resistance power and prevents the diseases. Rasāyana Cikitsā literally means rejuvenation therapy. Rejuvenation means to sustain youthfulness i.e. to preserve normal physiological condition.

Rasāyana (Rejuvenation therapy) is described elaborately in four padas of the first chapter in Cikitsā sthana of Charaka saṁhitā. In the beginning of Rasāyana therapy Charak Ācārya explains the term Bhesaja i.e. drugs and its two types as follows. (Ch.Chi.1/1/3.)

Bheshaja are of 2 types:

1. “Swasthasyaurjaskara i.e. those which improve or enhance the state of health in healthy individuals (Ch.Chi.1/1/4)
2. “Kinchit Artasya Rognut” i.e. those which are useful in diseased conditions (Ch.Chi.1/1/4)

Methods to promote health and prolong life span include Vajikaran and Rasāyana therapies.

स्वस्थस्योर्जस्करं यत्तु तदृष्यं तद्रसायनम् ॥<sup>3</sup>

Medicine belonging to first category is considered to be useful for a healthy person to maintain & promote health, which include use of Rasāyana therapies and drugs.

The Rasāyana Cikitsā is based on re-generative theory which includes rejuvenation of the body. It is beneficial for promoting life, improving the strength of the body, delay aging, and treating diseases. Even in treatment aspect, it is the safest method for children, old aged, critical stages of complicated diseases etc., where the constitutional resistance is least and vital capacity is at its lowest. The references from Samhita’s highlight importance of Rasāyana as therapy used to protect life, improve health, and enhance Bala (strength of the body) and to treat disease conditions.

Rasāyana Cikitsā is a therapeutic process of the development of a person at the Sharirika level and Manasika level. Integration, growth & development of the body are the important events related to healthy life. This is the continuous process of life occurring in breathing, circulation, food metabolism, sense perception and the functions of nervous system, even the processes of thinking or memory.



The life process occurs in the total constitution and at smallest cellular level, generating healthy tissues, organs, repairs of the damaged cells & to maintain the normal physiological functions of the body in manner to protect from various illnesses.

Rasāyana Cikitsā is directly related to the process of metabolism which occurs at different stages in the body. Rasāyana Cikitsā is also termed as ‘regeneration’ because of the same reason. The ongoing process of formation of Rasa Dhatu i.e. the nourishing substance of the human being, which helps to increase life span, memory & intelligence, youthfulness, tone, Bala (strength), freshness, indriya (sense organs) and Mana (mind). Rasāyana gives longevity i.e. increased life span and healthy life through regeneration of the body tissues and cells in the optimum quality.

The Ayurvedic Samhita’s have defined Rasāyana as a therapy to protect the Dhātus i.e. structural entities of the body up to their natural state of health, integrity & functionality, so as to achieve a healthy body with renewed development, growth and Bala (strength). Rasāyana thus can be understood as ideal therapy for Dhatu’s i.e. regeneration of the body’s structures.

Rasāyana Cikitsā should primarily pose qualities of preserving life and developing structures i.e. Dhatu’s. Rasāyana Cikitsā also should have food-values, in terms to be newly mixed with Rasa Dhatu to nourish the body and build the other Dhatu’s at different metabolic processes. The reconstruction of the body is based on these metabolic processes which start at Rasa Dhatu. That’s the prime reason for the complete therapy to be termed as Rasāyana where Rasa being the prime objective for success of the therapy.

Rasāyana Cikitsā is a therapy which helps attain the utmost quality of the Dhatu's i.e. tissues, which in turn helps provide Sharirika (physical) as well as Manasika (mental) Swasthya i.e. health, thereby preventing or delaying the process of Jarā i.e. ageing and also to protect oneself from disease conditions, nourishing in all the aspects, thus providing a healthy and longer life span with youthfulness.

The core of Swasthya Urjaskara i.e. enhancement of health is

- To delay the natural ageing process of the body
- To control the effects of Apraharsha (reduced excitement, pleasure or libido),
- To improve the Dhātu Kshaya due to various physical, mental or sexual activities or Anupachita Śukra (incompletely nourished, particularly improperly developed Śukra Dhātu).

The above description suggests that which corrects the ill state, and restore the damage of Dhātu's due to all the above said factors and promotes health (Urja) is called health promotive (Swasthasya Urjaskara) for a healthy person. Rasāyana means achieving the better qualities of Dhātus which means to gain the appropriate development of the Dhātus. Rasāyana is to withstand further ageing and to achieve healthy long life. Rasāyana Cikitsā helps to attain uttam Bala (strength), long healthy life, vitality, sthairyā (stability) and controlled ageing process with the pharmaco-dynamic qualities present in the various Rasāyana dravya's. Rasāyana Cikitsā helps prevent genesis of ageing or Jarā by using specific Rasāyana dravya's & food essence supplying products to get rid of ageing. Through Rasāyana Cikitsā one achieves optimum quality of Rasa Dhātus to all seven Dhātus. Rasāyana Cikitsā is the means of producing the best quality of Rasadi seven Dhātus<sup>4</sup>.

**HISTORICAL BACKGROUND:**

No direct references are available in any of Vedic literatures about Rasāyana Cikitsā. References regarding the beneficial effects of Rasāyana Cikitsā such as prolonging the life span, maintaining or establishing the youthfulness and also delaying the ageing process can be cited. In Rig-Veda, there are hymns saluting Ashwinis for their effective approach in maintaining the equilibrium of Tri-Dhātus and prolonging the life span<sup>5</sup>. Ashwinis, known as Devanam Bhishajau', were expert in the field of Rasāyana.

Their deeds concerned with Rasāyana are as follows:

- Turned Kaksivan young from old<sup>6</sup>.
- Kali was turned into a young subject<sup>7</sup>.
- Chyavana became younger and his life span got increased<sup>8</sup>.
- Citizens of Jahnu were endowed with strength and longer life span<sup>9</sup>.
- Ghosa who was diseased, old and unmarried was turned into a healthy and young lady who later got married<sup>10</sup>.
- Injured Syava was treated effectively and his life span lengthened<sup>11</sup>.
- Old sage Vandana was converted into a youth<sup>12</sup>.
- The life span of Somaka, the son of Sahadeva, got lengthened<sup>13</sup>.
- Devas became Ajaramara by consuming the elixir which was originated during.
- Samudra manthana and so are the seven great sages (Sapta Chiranjivis).

In Yajurveda also, one can notice the chants increasing the life span and beneficial effects of Rasāyana such as improving the status of

Indriyas. The prayer to Almighty God frequently seen to increase the life span of an individual<sup>14</sup>.

Atharva Veda, to which Āyurveda is closely related, gives more references of Rasāyana. Some of them are listed below:

Aap (water) is considered as the best medicine in the universe and it is the best Rasāyana Dravya<sup>15</sup>.

Devas (Gods) neither become old nor they become a victim of death<sup>16</sup>.

Aap (water) increases the Urja (strength) of the body<sup>17</sup>.

The individuals will be devoid of gray hair and mental instability, having strong teeth and body and perfect body activities. Soma, the king of medicines, was given due importance in all Vedas, Brahmana Granthas, Upanishads, Puranas and later in Saṃhitās<sup>18</sup>.

A reference from Taittiriya Brahmana indicates the practice of Rasāyana by which sage Bharadwaja was turned younger four times by Lord Indra. Similarly, Upanishads, Puranas and other post Vedic treatises have highlighted the practice of Rasāyana. Charak Samhita has dedicated the first chapter for Rasāyana in Cikitsā sthana and divided into four Padas. Rasāyana has been given first preference because it not only maintains the healthy state of an individual but also cured ailments, the two faces of Cikitsā. Suśruta also dealt Rasāyana in four separate chapters in Cikitsā sthana where Vāgbhata have described in only one chapter in Uttaratantra. Later compilations like Bhavaprakash, Sharangadhar Saṃhitā, and Yogaratnākara have also dealt Rasāyana in a separate chapter which followed Vāgbhata.

## References from Samhitā's

### **Charaka Samhitā**

Charak Samhitā the oldest & supreme text in relation to Cikitsā has given extensive consideration on the subject of Rasāyana. In the beginning of Cikitsā sthana Chapters on Rasāyana therapy and Vajikarana are explained. Cikitsā sthana begins with a chapter on Rasāyana therapy dealing with the physiological, pharmacological, therapeutic and clinical aspects of the Rasāyana. Charaka Ācārya appears to have correlated this with the fundamental principles of Āyurveda as related to the concept of Ras Samvahan, the concept of Dhātu, the Agni, the Srotas, the Doshas and the Dosha Prakriti. Charaka Ācārya advised two major types of Rasāyana i.e. Kutipravesika & Vatatpika (indoor and outdoor regimen) and explained a variety of Rasāyana drugs both the single and compounds, herbs and minerals (Ch.Chi 1/1/16). The knowledge appears to have been so much developed that Rasāyana therapy has been designated as one of the eight major branches of Āyurveda specialized in prevention of diseases and a tool in maintaining and promoting the health of a healthy individual<sup>19</sup>.

### **Chakradutta**

Chakradutta emphasizes the role of Sanshodhana therapy as a Poorvakarma for Rasāyana therapy. References of Rasāyana drugs like Chyavnaprash, Bhallataka yoga, Vardhmaan Pippali Rasāyana, Agastya Haritaki, Vyaghri Haritaki and Loh Rasāyana etc. are available in this Samhitā. Chakradutta advised use of Haritaki in various seasons under the term Ritu Haritaki to be undertaken by every healthy individual to prevent disease arising through seasonal changes. Description of certain minerals like Loha, Shilajatu, Swarna, Rajat and Tamra is seen under Rasāyana. Chakradutta has also described use of Rasāyana Drugs In younger and middle age groups<sup>20</sup>.

**Suśruta Saṃhitā**

Rasāyana described in Suśruta saṃhitā is similar to Charaka Saṃhitā but the presentation of Rasāyana therapy is in different ways. Suśruta Ācārya omitted the philosophical aspects of subject. Suśruta Ācārya has not elaborated any specialized regimen of Rasāyana Therapy like Vatatpika and Kuti-praveshika procedure of Charaka saṃhitā. A unique contribution from Suśruta Saṃhitā is advising the use of Ahara for Rasāyana treatment which seems to be an important contribution. Dalhana while commenting on Suśruta Saṃhitā considers this context comparable to Kuti-praveshika procedure of Charaka Saṃhitā. The most important contribution of Suśruta Ācārya and the commentator Dalhana in understanding of Rasāyana therapy is the classification of Rasāyana (Su.Su.1/10 Dalhana) which describes that Rasāyana therapy has two aspects<sup>21</sup>:

1. Kamyaa Rasāyana
2. Naimittika Rasāyana

Rasāyana drugs mentioned Suśruta Saṃhitā are:-

Single drugs<sup>21</sup>

- Kala-megha
- Varahi Kanda
- Golami
- Chattra
- Atichatra
- Gambhari Phala
- Shwetakshi
- Karvir

Formulations<sup>21</sup>

- Shweta Bakuchi Yoga
- Krushna Bakuchi Yoga
- Vacha Rasāyana
- Shatpaka Vacha ghrita
- Ayur-varadhaka Rasāyana
- Nilotpala Kwath
- Vasa taila Yoga
- Rasāyana Samrthaprad Yoga
- Daridrya Nashak Yoga
- Yavadi Yoga.

Some other Dravya's like, Kashmari, Vacha, Brahmi, Vidanga are mentioned for their Rasāyana uses. Also 24 types of somas have been highlighted under the Rasāyana chapter.

**Vāgbhata**

Aṣṭāṅga a Sangraha and Aṣṭāṅga Hridaya written by Vāgbhata Ācārya appear to have included the descriptions of Charaka Saṃhitā. Few newer drugs have been introduced in these texts. The types of Rasāyana i.e. Ācāra Rasāyana, Vatatapika Rasāyana and kuti pravesika Rasāyana etc. are same as per the references of Charak Saṃhitā. Vāgbhata Ācārya highlights importance of the age factor in selection of people for the use of Rasāyana, which as per Vāgbhata Ācārya is Rasāyana should be used in young or middle age groups. Such references are not is seen for prescription of Rasāyana therapy in younger age groups in other Saṃhitā's. Vāgbhata Ācārya has also mentioned about the use purva karma i.e. certain acts to be followed before the administration of Rasāyana drugs<sup>22</sup>.

### **Bhel Saṃhitā**

Bhel Saṃhitā which is supposed to be writing during the same period as that of Charak Saṃhitā is not available in complete form. Ācāra Rasāyana has been mentioned in this Saṃhitā. Bhel Saṃhitā describes Rasāyana in chapter named “Dirghayushyopaya”. Indication of Rasāyana in “Rajyakshama” which is closely resembled to tuberculosis is seen Bhel Saṃhitā. Pippali Rasāyana and Pippali Vardhman Rasāyana are highlighted. Rasāyana in the form of Basti for Śukra Shodhana or Rasāyana Basti can be seen in Bhel Saṃhitā<sup>23</sup>.

Rasāyanas preparations elaborated in Bhel Saṃhitā are:-

1. Jeevakadi Ghrita
2. Maha-sneha
3. Shatavaryadi Basti
4. Pancha moolyadi Rasāyana
5. Sukumar Taila

### **Kāśyapa Saṃhitā**

Kāśyapa Saṃhitā is not available in the complete form. Kāśyapa Saṃhitā does not have any separate chapter dedicated for Rasāyana Cikitsā. There are scattered references of Rasāyana Cikitsā in different context of the Saṃhitā. Rasāyana Cikitsā is specially indicated in the treatment of “Rajyakshma”. Rasāyana Cikitsā has also been advised to be used in cases of Kshaya and in Ksheena<sup>24</sup>.

Dravya’s mentioned in Kashyapa saṃhitā:-

#### Single drugs

- Braahmi
- Lasun

#### Formulations<sup>24</sup>

- Shatapushpa Kalpa
- Lasuna Kalpa
- Madhu & Sarkara



References of various types of Kshira and Mamsa as Rasāyana can be seen in Kāśyapa Saṃhitā. Nagabala, Yastimadhu, Braahmi, Rasona, Mandookparni etc. are mentioned in the management of “Rajyakshama” i.e. tuberculosis. While describing the properties of Shata-pushpa, shatavari and Lasuna Kalpa, Kāśyapa highlights concepts of bruhmana, Balakara, Vrushya, Varnya & Oja-varadhan, Ayusha vardhak, Smriti, Medha Vardaka, Vayasthapana etc. properties Rasāyana Cikitsā. Kāśyapa Ācārya has also indicated purva Karma for Rasāyana Cikitsā<sup>24</sup>.

### **Śāraṅgadhara Saṃhitā**

In Śāraṅgadhara Saṃhitā specific description on Rasāyana Cikitsā is not seen but references about Rasāyana Cikitsā can be studied in the saṃhitā. The significance of Rasāyana Cikitsā in Śāraṅgadhara Saṃhitā is the definition of Rasāyana which has been elaborated. Śāraṅgadhara Saṃhitā defines Rasāyana as means by which one can delay ageing and helps prevent diseases conditions thereby maintaining the positive health of an individual<sup>25</sup>.

Single Rasāyana drugs mentioned in Śāraṅgadhara Saṃhitā are:

- Amruta
- Rudanti
- Guggul
- Haritaki
- Suvarna

Formulations<sup>25</sup>:-

- Loha Rasāyana
- Kamdev Ghrita
- Chyawanprasaha Avleha
- Agasthya-haritaki Avleha
- Kaishor Guggulu
- Yogaraj Guggul

### **Bhāvaprakāśa**

An independent chapter on Rasāyana is explained in which a comprehensive definition of Rasāyana and a various Rasāyana dravya's and preparations are included. Long healthy life and enhanced mental health is supposed to be few important effects of Rasāyana Cikitsā. Mandukpaarni, Ashvaganda, Haritaki, Guggul etc. are explained with special consideration. Bhāvaprakāśa Saṁhitā emphasizes on the importance of sam-shodhan Karma as a Purvakarma for Rasāyana Cikitsā<sup>26</sup>.

### **Yogarātnākara**

Yogarātnākara has independent chapter on Rasāyana. Madhya as Rasāyana has been explained in this Saṁhitā. Jala (water), Dugdha (milk), Madhu (honey), and Ghrita are advised as Rasāyana and specific description on Haritaki as Rasāyana has been given. Description of Vardhamana Bhallataka Prayoga has also been elaborated<sup>27</sup>.

While practicing Rasāyana Cikitsā, following points are considered to be of main importance

- Prakruti (Constitution)
- Vaya (Age of the person)
- Satmya
- Dhātus (structural organization of the body)
- Srotas (systems)
- Agni (Digestive fire)
- Oja

Along with Rasāyana Cikitsā, Yogarātnākara has also advised that a person desirous of optimum results of Rasāyana should consume a suitable regime of diet and follow a specific code of psychosocial conduct as prescribed in Ācāra Rasāyana<sup>27</sup>.

**ETYMOLOGY:**

The term Rasāyana is formed from two words viz. Rasa and Ayana.

The word 'Rasa' is formed from 'Ras Gatau' Dhātu and 'Ac' Pratyaya. Ācārya have given various meanings for Rasa at different contexts. Some of the common are

1. Rasa is one that is experienced by Rasanendriya.
2. The one that nourishes Rasa, Rakta, etc. Dhātus (continuosly) daily is called Rasa.
3. The essence of the digested foodstuff is known as Rasa.
4. The one that traverses throughout the body due to its liquidity is termed Rasa.
5. Rasa is one that moves all over the body continuously.

The word Ayana has various meanings as given in ShabdhaKalpa Druma and Vachaspatyam. They are pathway, movement, road, place, site, abode, a way of entrance, an entrance etc<sup>28</sup>.

Rasāyana means the pathway for essence of food substances towards all body tissue elements so as to nourish and replenish them. V.S. Apte, famous grammarian, in his Sanskrit English Dictionary, states that Rasāyana is - an elixir of life (elixir vitae) - any medicines supposed to prolong life and prevent old age - serving as an elixir vitae i.e., that which gratifies or regales. The classics have given the synonym Rasayani for Srotas which means Channels which carry nutrients for vivid body tissues.

### **Vyutpatti – Nirukti of Rasāyana**

Etymologically the term Rasāyana comprises of two components viz., *Rasa* and *Ayana*. *Rasa* - *Rasa* is derived from the root ‘*ras*’ meaning *gatou* or to move. The fluid that always moves from one place to another is termed as *Rasa*. This word is used liberally in various senses like Mercury, a taste, water, sap or juice, essence, essential fluid of the body etc. The word meaning of *Rasa* in *Rasāyana* is the body fluid necessary for the nourishment of the entire body.

*Ayana* is derived from ‘*Aya*’ meaning to flow i.e. through which the movements of materials take place<sup>29</sup>. Literally *Ayana* gives the three meanings such as *Jnana* (knowledge), *Gamana* (movement) and *Prapti* (attainment). *Rasāyana* means *Rasa Prapti*.

*‘Rasanam Rasaraktadeenam, ayanam prapanam apyayanam va iti Rasāyanam’*

*Rasāyana* is that which causes *Apyayana* of *Dhātus* like *Rasa* and *Rakta* or that which promotes *ayu*, *bala*, *veerya*, *dardhya*, *vaya* and *Sthairya* from the factors which are present in the *rasa*, *veerya*, *veepaka* and, *prabhava* of the *bheshaja* or which establishes or ensures the assets which are not present.

### **Paribhasha**

*Dravya*’s, *Ahara* (food) and *Vihara* (routines) which helps in promotion of longevity and prevention of aging and diseases are called *Rasāyana*’s. *Rasāyana* is a therapy through which the drugs prevent the senility, cure the diseases, preserve the youthful state, improve the eye sight and act as restorative. A procedure by which *Rasadi Sapta Dhātus* are sanctified in all respects through proper nourishment is known as *Rasāyana*.

Thus Rasāyana improve the tissue nutrition. An ideal Rasāyana agent prevents premature aging, promotes intellect and memory, provides immunity against diseases and thus helps an individual in leading a long healthy and energetic life.

### **Prayojana**

Rasāyana Cikitsā helps in enhanced life span, Manasika swasthaya (mental health), intellect, and relief from diseases conditions, teja (luster), varnya (complexion), and improvement in voice, increased potential of the body and the Indriyas (senses) Vak-siddhi, respect and brilliance. Ācārya Suśruta describes the merits of this discipline of medicine as that which promotes longevity exceeding 100 years along with healthy status of life, maintains youthful state, improves intellect and Bala and provides capacity to fight against diseases by producing immunity.

### **Bheda (types)**

Following is the classification of Rasāyana

#### **According to the effect of Rasāyana**

1. Samshodhana Rasāyana
2. Samshamana Rasāyana

#### **Samshodhana Rasāyana**

There are certain Rasāyana drugs which when used may induce vamaṇa, virechana karma in the body and thus the body gets purified. Vitiated doshas are expelled from the body. These are called Samshodhana Rasāyana.

**Samshamana Rasāyana**

Samshamana group of Rasāyana drugs produces Rasāyana effect in the body restoring dosasamya or internal homeostasis and metabolic constancy.

**According to the mode of administration**

1. Kutipravesika Rasāyana
2. Vatatapika or Saura-marutika Rasāyana

**Kutipravesika Rasāyana**

It is a type where samshodhana karma is essential. After Samshodhana patient enters into a specially constructed therapy chamber. He has to follow specific code and conduct of life with strict diet control. It is said that if Kutipravesika Rasāyana is carried out as per the norms laid down it leads to complete bio-physical transformation of man.

**Vatatapika Rasāyana**

It is indicated in those patients who do not have enough resources and who cannot afford intensive rejuvenative care. This therapy is used while leading normal life. Samshodhana karma is not essential in such cases.

**Special Rasāyana drugs and measures**

1. Medhya Rasāyana
2. Ācāra Rasāyana

**Medhya Rasāyana**

Some Rasāyana possess medhakara effect and hence they are specially known as medhya Rasāyanas. Medhya means anything that is beneficial for medha, which is responsible for Dhi (intelligence), dhriti (retention power) and smṛuti (memory).

**Ācāra Rasāyana**

It means rejuvenating life style with such social and personal conducts by which one can acquire the Rasāyana effect. It includes improved personal behavior, social behavior and Satvika Ahara. Ācāra Rasāyana is essentially a non-pharmacological approach to social and mental health care leading in turn to positive health and longevity.

**According to the objective**

- 1) Kamyā Rasāyana
  - i) Pranakamyā
  - ii) Medhakamyā
  - iii) Shrikamyā
- 2) Naimittikā Rasāyana
- 3) Ajasrikā Rasāyana

**Kamyā Rasāyana**

Kamyā Rasāyana is that which is used in healthy persons for maintenance and promotion of positive health.

**Pranakamyā**

It promotes longevity and lifespan.

**Medha kamyā**

It improves mental faculties.

**Srikamya**

It improves beauty and luster of the body.

**Ajasrika Rasāyana**

It is used in the form of Sattvika ahara consisting of Ghrita, Ksheera etc. Constant use of such nourishing diet produces non-specific Rasāyana Prabhava in the body.

**According to the use**

Ācārya Suśruta explains the concept of Rasāyana in four chapters in Cikitsā sthana where he classifies them according to their utility.

1. Sarvopaghata Shamaneeya
2. Medhayushkameeya
3. Swabhava Vyadhi Pratishedhaneeya
4. Nivrutta Santapeeya

**Sarvopaghata Shamaneeya**

It is the Rasāyana therapy that concentrates on relieving all possible obstacles to the health and longevity.

**Medhayushkameeya**

It is the Rasāyana therapy that aims at promoting intellectual power and longevity.

**Swabhavavyadhi Pratishedhaneeya**

It is the Rasāyana therapy having the aim to relieve Swabhavika Vyadhis or naturally occurring Kshut, Pipasa, Jara, Mrutyu, Nidra etc.

**Nivrutta Santapeeya**

It is a type of Rasāyana procedure administered with an aim to relieve the dukha concerning both Shareera and Manas.



**Naimittika Rasāyana**

In Āyurveda, Naimittakara Rasāyana is explained in the management of specific diseases. These include single drug as well as compound preparations of both herbal and herbo-mineral origin indicated in patients of specific disease in order to promote the vitality.

Naimittika Rasāyana are not collectively explained in any chapter in the classics while compound preparations containing Rasāyana drugs specific to the diseases and Srotas are explained under general treatment of each diseases. Innumerable numbers of Naimittika Rasāyana Yoga are found in the classics for example Agasthya Haritaki Rasāyana in Shwasa Roga.

Naimittika Rasāyana does not mean treatment of a specific disease, but used as an supportive to the specific treatment. It aims at correcting the physiological factors like Agni, Srotas, Dhātus thereby helping to cure the disease faster and bringing back the normalcy. It treats the emaciation caused by the pathological factors of the disease by promoting Dhātu Poshana. It also helps in increasing Oja and thereby Bala of the patient to withstand the severity of the disease and to fight against the diseases.

**Ajasrika Rasāyana**

Ajasrika Rasāyana is one among the classification of Rasāyana, where consuming of the Rasāyana Aushadhi is indicated daily. The constant use of such Rasāyana produces specific Rasāyana effect in the body. Ācārya Dalhana has explained Ajasrika Rasāyana in the form of Dugdha and Ghrita.

**Indications of Rasāyana**

Rasāyana is indicated to be administered only after appropriate Samshodhana Karma followed by Samsarjana Karma. It can be used according to the necessity but several factors should also be considered such as Vaya, Satmya, Desha, Prakruti, Kala, Dhātu and Vyadhi.

Ācārya Suśruta have indicated that Rasāyana to be administered in Poorva Vaya and Madhyama Vayas<sup>30</sup> which are 16-30 years and 30-60 or 70 years respectively, to get maximum benefit and it is said to be not useful in Vriddhavastha and in children. Commentator Gangadhara clarifies that this is because they cannot tolerate the Samshodhana therapy and persons who are fit for shodhana are also eligible for Rasāyana therapy<sup>31</sup>. Also, there are specific Rasāyanas for specific age groups that help in restoring the loss of specific bio values of the respective ages.

It should be administered to the suitable persons who are devoid of grief and possess required Bala. Generally Rasāyana is contraindicated in these persons who are Alasi, Daridra, Pramadi, Vyasani, Papakrud, Bheshajapamani, and also the persons with evil designs, who is not free from diseases and who has no faith in this therapy. Rasāyana therapies produce effects in persons whose mind and body are pure and self- controlled.

**Time for Rasāyana drug**

Suśruta Ācārya advices to use Rasāyana dravya's in middle age, as it is more beneficial in middle age. The administration of Rasāyana dravya's during this period of life will stimulate tissue growth and retard degenerative changes.

**Rasāyana and Swasthya (health) relationship****Definition of Swasthavritta: (Healthy Regimens)**

The word “Swasthavritta” is made of three words – Swa, stha and Vritta, where Swa & stha represents a disease free condition of self and vritta is the regimen or methods or means to attain the same according to Āyurveda. Those all vritti i.e. efforts which help to maintain balance between Dosha, Dhātu's and Mala, and which are beneficial for carrying the normal functions of the body is termed as swasthavritta. Swasthavritta helps to achieve the goal of complete health and well-being.

The regimens to be followed to attain optimum levels of health are Swasthavritta. The essence of Āyurveda is the theory for preserving the health of healthy individual and prevention of diseases. Even after centuries past, even the nature of disease has evolved; newer illnesses have replaced some of the old. Still, concept of Āyurveda for maintenance of health and prevention of diseases withstands the present world. This concept of maintenance & promotion of positive health, ways to prevent or protect oneself from harmful effects of the illness is "Swasthavritta"

**Definition of Swastha: (Health)**

Charak Ācārya has used the various terminologies like Prakriti, Swastha, Sukha, Arogya, Dhātu samya as substitutes for Swasthya. Instead of defining the Swastha in Swastha chatushka, Charak Ācārya has defined Swastha in Nirdesha Chatuska by Nirdesa Tantrayukti as "disorder is disequilibrium of Doshas and Dhātus, and their equilibrium is health. Health is known as happiness while disorder is unhappiness"

Arogya has two syllabuses. 'Aa' and 'Rogya' the former means "till or up to" the condition; the latter openly signifies the condition that renders a

man liable to be caught by diseases. Arogya or health is thus a physical condition of a being in which the body is immune to all disease.

Suśruta Ācārya defines a Swastha Purusha as<sup>32</sup>:-

- A person having equilibrium of the Doshas i.e. Sama dosha.
- A person having normal functioning of Agni i.e. Sama Agni
- A person having normal condition of all Dhātus i.e. Sama Dhātu
- A person having normal functions of Mala i.e. Mala kriya.
- The Atma, the Indriyas (senses) and Mana (mind) should be happy and cheerful i.e. Prasannatamendriya mana.

The modern definition of health seems to be incomplete in comparison with the excellent interpretation of health described in Suśruta Saṁhitā where the concept of spirituality is found to be missing.

### **Positive Health vis-a-vis Dhātusamya:**

In Charka Vimana sthana, criteria for the assessment of Dhātusamya were explained. This includes the entire feature, which is necessary to achieve positive health.

Biologically, positive health is a state, in which every cell and every organ is functioning at its optimum capacity and in perfect harmony with the rest of the body. It is represented by Samadosha, Samagni, SamaDhātu malakriya.

Its criteria can be summarized as

- Normalcy of voice and complexion
- Increase in strength
- Desire for food
- Relish the meal time

- Timely evacuation of flatus, urine feces
- Proper and timely digestion of taken food

Psychologically, as a state in which the individual feels a sense of a perfect well-being and mastering over his environment.

Socially, as a state in which the individual feels his capacity for the participation in social systems at its optimum.

‘Prasannatmendriyamana’ denotes both psychological and social positive health. Criteria for assessment are:

- Timely sleep
- Nonappearance of abnormal dreams
- Easy awakening
- Overall normalcy of mind, intellect and sense organs

Suśruta Ācārya in Suthrasthana 15 systematically defines this, as particular sequence of explanation is reflecting Karya Karana Vada. The equilibrium state of Dosa is Karana for the Karya Samagni and its Karya is SamaDhātumalakriya; in total, this results in Prasannatmendriyamana. There by achieving total health.

### **Characteristics of Swastha:** (Healthy Individual)

Individuals having proportionate musculature and compactness (Sama mamsa and Sama samhanana) of the body with strong sensory organs will overcome.

- Onslaught of diseases
- Can withstand hunger and thirst
- Can withstand heat of the sun and cold
- Can withstand physical exercises

- They can digest and assimilate the food properly.

### **Concept of ‘Swastha’ and ‘Swasthya’**

Āyurveda advocates multi-dimensional concept of health. Absolute healthy status is a difficult proposition. Ultimate aim of the life – Purushartha chatustaya. Positive health can be achieved through means of chaturvidha Purushartha.

### **Swastha Vs Swasthya**

Swasthya-(Health) Health cannot be defined as a State. Setting Universal health standard is not possible.

Swastha-(A healthy person) Process is continuous adjustment. Parameters Vary with prevailing ecological Conditions.

The motive of Āyurveda is to prevent the disease and to maintain the healthy state of the healthy individual. As directed in Swasthavritta one who follows Ayurvedic lifestyle achieves a long and healthy life. The individual thus gets respectful position in the society and achieves Purushartha chatustayas.

The shareera is defined as the entity which is combination of the pancha mahabhuta vikara samuha and which is samyogavahi when this shareera has the vitiated Dhātu then it starts getting rogas. The vitiation starts with the either with the Vridhi or Kshaya of the Dhātu which is depicted by the organ or the human constitution.

Equilibrium of Dhātus is called as health and vitiation in the Dhātus itself is called disease condition so it is very prime factor that maintenance of Dhātu samyata.

**W.H.O. definition of Health**<sup>33</sup>

Health is defined as a complete state of physical, mental, and social well-being of a person and not the merely the absence of disease or infirmity.

**Regimen's to achieve Swasthya- (Health)**

The man who indulges in -

- Pathya Ahara (Wholesome food) & Sadvritta (good conduct)
- Moves cautiously
- Unattached to senses
- Donate
- Equality
- Satya (truth)
- Devoted to authority

Thus, Swasthavritta provides means through Ayurveda standard of living which enables an individual to fulfill his vyaktika (personal) and Samajika (social) needs to the fullest. In simple words, it enhances the qualitative as well as quantitative aspects of the individual perspective and its social attachments. By considering fourfold necessary and scope, Ācārya Charak has dealt topic of Swastha (health) in separate Chatuska known as Swastha Chatuska.

**Parameters for assessment of Arogya Lakshana**

The features of Arogya explained in Kashyapa Samhitā<sup>34</sup> as follows.

1. Ānnabhilasha (desire for food)
2. "Bhuktasya paripaka (easy digestion of food)
3. Srusta vinmootratwa (excretion of feces urine and flatus)

4. Shareerasya laghavam (lightness of body)
5. Suprasnnendriyatwa (perspicuity of indriyas)
6. Sukhaswapna prabodanam (comfortable sleep and awakening)
7. Bala varna ayushya labha (attainment of strength complexion & life)
8. Soumanasya (happiness)

Every individual in this world wants to live healthy for a long period. Rasāyana Cikitsā i.e. Rejuvenation therapy is explained in Āyurveda for healing and regeneration of living tissues i.e. Dhātus in the body.

Rasāyana (Rejuvenation therapy) is one of the eight branches of Ayurveda. Rasāyana is specialized procedure used in form of rejuvenate methods and Dravya's, nutrition and Ācāra (codes of conduct) or behavior i.e. Ācāra -Rasāyana.

*“Labopayo hi Shastanam Rasadinam Rasāyanam”* <sup>35</sup>

Rasāyana (Rejuvenation therapy) means the way for attaining excellent Rasa i.e. one attains longevity, memory, intelligence, freedom from disorder, youthful age, excellence of luster, complexion & voice, optimum strength of physique and sense organs, successful words, respectability and brilliance.

### **The effect of Rasāyana** (Rejuvenation therapy)

Considering the Ayurvedic concepts of physiology, Rasāyana agent promotes nutrition through one of the following three modes:

- By direct enrichment of the nutritional quality of Rasa (nutritional plasma) - Shatavari, milk, ghee etc.
- By promoting nutrition through improving Agni (digestion & metabolism) - Bhallataka, Pippali etc.



- By promoting the competence of srotas (microcirculatory channels in the body)-Guggulu.

Another important factor for maintaining good health and staying active even in the old age is called as rejuvenation therapy (Rasāyana Cikitsā). Therefore, a healthy person should take rejuvenating preparations to maintain good health and stay young. There are many such Ayurvedic preparations available, which can be taken according to season and personal constitution.

Good social conduct, morality, good manners and good character are some other factors, which are necessary to stay away from diseases. Thus, Āyurveda approaches the complete individual while giving instructions about maintaining the health. Rasāyana Cikitsā is meant to control the ageing process and to delay the destruction of the body.

- Rasāyana Cikitsā improves the Dhi Dhruti, Bala (strength), teja (luster of the skin), and vak-siddhi (voice).
- Rasāyana Cikitsā nourishes the Dhatu's, and thus prevents chronic diseases or illness.
- Rasāyana Cikitsā Improves Agni i.e. the metabolic activities of the body and prevents diseases related to ageing.
- Rasāyana Cikitsā helps to attain highest level of physical strength i.e. Bala and optimum functions of the sense organs.
- Rasāyana Cikitsā has specific action on reproductive system which helps in the production of good quality of Śukra Dhātu.
- Rasāyana Cikitsā helps in the nourishment of the body thereby improving the defense mechanism and the natural resistance of the body to various diseases.

Ācāra Rasāyana helps at spiritual level to increase Satva guna which is useful in day to day routines like speaking truth, controlling angry, sense organs and providing calmness to mind and soul.

Considering these various effects of Rasāyana indicating the use of Rasāyana Cikitsā, will lead to a healthy long lifespan, youthfulness and free from all the ailments of the body with delayed ageing process. Rasāyana Cikitsā or Rasāyana dravya's may also have immunity enhancing effect which helps prevent diseases which protects body from the disturbances in Dosha, Dhatu's thereby allowing them to carry their normal function & maintain the healthy state of individual.

**Need For Rasāyana in Swastha**

(Rejuvenation therapy for healthy person)

1. Hita and sukha Ayu
2. Promotion of positive health
3. To achieve chaturvidha Purushartha
4. To avoid Akalaja jara and to delay

**Ācārya Śāraṅgadhara explained the Rasāyana according to the age group <sup>36</sup>**

Table 1 - Rasāyana According to Age

AGE (in years)	DRAVYAS (Drugs)
1 yr.- 10 yrs. (Bala)	vacha, Suvarn, kasmari
11 yrs. - 20 yrs. (vruddhi)	Kasmari, Aswagandha, Bala
21 yrs. - 30 yrs. (chabbi)	Loha, Amla
31 yrs.- 40 yrs. (Medha)	Shankh-pushpi, Jyotish-mati
41 yrs.- 50 yrs. (twacha)	Soma-raji, Bhrungaraja,
51 yrs.- 60 yrs. (Drushti)	Jyotish-mati, Triphala, loha
61 yrs.- 70 yrs. (Veerya)	Atmagupta, vajikaran dravyas
71 yrs.- 80 yrs. (Vikram)	Bala, Amla
81 yrs.- 90 yrs. (Buddhi)	Brahmi, Shankh-pushpi
91 yrs.- 100 yrs. (Karmendriya)	

Rasāyana are formulated with the intention of bringing back into balance one or more of the five elements, which are put out of balance from improper diet etc. In return, this promotes balance on the physical, mental and subtle levels of our being, which will add life to our years as well as years to our life.

**Rasāyana for Healthy Individual**

Āyurveda, a life science, gave the unique concept of balanced diet under the heading of Nitya Sevaneeya Dravya (Foods that are permissible to eat on daily basis). Promotion of proper nutrition is one of the eight elements of the Primary Health Care.

Though great advances are made in the last fifty years in the knowledge of nutrition & practical application, poor section of the population continued to suffer from malnutrition in spite of increase in the food production. To bring global attention towards Ayurvedic system of medicine in concern to nutritional programme and to implement & to develop more nutritional programme in our system, a great interest has to be focused on the role of dietary factors in the promotion of health.

Nitya sevaneeya Dravya's explained in Suśruta and Vāgbhata Saṃhitā, indicates the need for the Rasāyana for healthy individual. The list of food ingredients those are advisable to consume daily are Shashtika shali (unpolished rice), Godhuma (wheat), Yava (barley), Mudga (green gram), Pathya (), Amalaki (Indian gooseberry), Mridwika (dry grapes), Dadima (Pomogranate), Triphala, Patoli (snake gourd), Madhu or Kshoudra (Honey), Sharkara (sugar), Sarpi (ghee), Jangala mamsa (meat of animals), Saindhava (salt), Antariksha jala or divyodaka (pure water).

**Mode of Action of Rasāyana**

The word Rasāyana essentially refers to acquisition & circulation of nutrition needed to provide nourishment to the body tissues and tissue perfusion. Hence it may be presumed that a Rasāyana agent acts at any of the following three levels, viz. Rasa, Agni, and Srotas.

**Rasa**

Rasāyana agents might enrich the nutritional quality of poshaka rasa as most of them physically contain high quality of nutrients in their bulk and when administered; it is added to the nutrients present in the Poshaka rasa and in turn help in improving in Dhātu Poshana. Eg: Ghrita, Ksheera, Shatavari, etc.

**Agni**

Rasāyana agents improve the Agni Vyapara and thus promote Dhātu Poshana. Several Rasāyana drugs are known to have Deepana and Pachana properties by the virtue of their qualities like Laghu, Ushna or by Prabhava, thereby promote the functions of Koshatagni for the digestion of food and of Dhatvagni to vitalize the metabolic activity, resulting in turn to improved nutritional status at the level of Dhātus. Ex: Pippali, Bhallataka, etc.

By their virtue of Deepana and Pachana action they digest and destroy the specific Ama present in the Srotas and also help in removing the obstruction in the Srotas. By this the Naimittika Rasāyana act as adjuvant to the specific Vyadhihara medicines prescribed for the disease and enhance their effect.

By the above actions they facilitate the adequate movement of Dhātus relative to the Srotas and also the rasa which is carrying the doshas thus the mala sanchaya roopi ama is removed. This helps in the scavenging of the Srotas.

**Srotas**

Some of the Rasāyana drugs promote the functions of Srotas which helps in supply of nutrients to the cells & tissues improving cellular perfusion. This is one of the mode through which a Rasāyana Cikitsā may work in promotion of nutritional status. Ex: Guggulu.

**Rasāyana and Vyadhikshamatva**

Rasāyana by virtue of their qualities, actions and prabhava promote Oja. Oja is considered as the quintessence of all Dhātus of the body. It is this Oja which is responsible for imparting Bala in an individual.

Bala or resistance or Vyadhikshmatva is responsible for an individual to guard himself against diseases and infection.

Vyadhikshmatva is classified into two types namely, vyadhi utpada prakatibhandakatva and Vyadhi bala Virodhitva. The first type is Bala or resistance of a person against the onset of a disease. It is produced by general Rasāyana in the body. The second type is achieved by the timely administration of Naimittika Rasāyana.

There are various levels of actions of the effect Rasāyana Cikitsā in general on nutritional aspects. Some Rasāyana Dravya's may have beneficial effect on certain targeted Dhātus and organs like brain (Medhya Rasāyana), lungs, eyes etc. It may be assumed that they provide specific medicinal nutrients for the respective cells & tissues and promote growth & development of specific peculiar healthy functions. Similarly Naimittika Rasayana explained in classics for each disease have some medicinal nutrients for respective tissues and Srotas and promote Bala or Vyadhi Bala Virodhaka type of resistance to that particular Srotas.

**Rasāyana and Doshahara Action:**

Naimittika Rasāyana has Doshahara action also by the virtue of their qualities and properties. These might act specifically on the sthanika Dosha present in the Srotas and palliate the aggravated ones or promote the diminished ones.

These entire actions specific to the Srotas are achieved in all the disorders concerning that Srotas. Hence, Naimittika Rasāyana is usually indicated in the multiple disorders specific to the Srotas in the classics and it provides promotive, preventive, curative and rehabilitative health care.

Modern nutritional supplementations may not fulfill the requirement, as they do not correct metabolic derangements. But Rasāyana Aushadhi exerts their efficacy by correcting Dhatvagni and clearing the Srotas due to Deepana and Pachana effects.

Rasāyana Tantra is one of the branches of Aṣṭāṅga Āyurveda. Rasāyana Cikitsā improves Agni i.e. digestive fire in turn supplying appropriate nutrients leading to improvement in the biological requirements of the body. This improved state of nourishment is supposed to lead to a series of secondary effects like prevention or delaying of ageing and longevity, improved immune response to the disease conditions, enhanced mental capabilities, increased vitality and luster.

**Drug is having the following properties may be considered as Rasāyana:**

- ✓ Promotes the Physical and Mental Health.
- ✓ Improves Over all personality.
- ✓ Prevents Ageing as well as cures ageing related problems.
- ✓ Prevents diseases and provides relief in diseases.
- ✓ Produces the tissues of the best/optimum quality

**Merits of Rasāyana Therapy:**

The following lines illustrate the facts about the uses of vitalization therapy - “long life, increased memory and intelligence, freedom from disease, youth, excellence of luster, complexion, voice, strength of body and mind are obtained by vitalizers.” These materials termed as

“Rasāyana” may be inducers of beneficial enzymes, hormones during health and disease.

Rasāyana therapy arrests ageing (Vaya-Sthapan), increase life span (Ayushkarm), intelligence (Medha), strength (Bala) and enables one to prevent disease (Rogapaharana Samartham). Rasāyana keep off ageing (Jarā) and prevent disease (Vyadhi).

### **Critical Analysis of Rasāyana:**

Wide scope and application of Rasāyana may be understood by going through its merits. There are some delighting explanations which really widen the scope and thoughts about Rasāyana. One among the eight branches of Āyurveda is Rasāyana. It augments the concept and applications of Rasāyana i.e. which roots out morbidity, destructive of diseases, checks disease process, corrects the various body channels, restores the nourishing and promote the health.

Rasāyana not only alleviates or cures diseases but also maintains the intactness of body components and enhances the life expectancy.

However vigor promotive may act sometimes as curatives. Disease curatives may act sometimes as vigor promoters. Some drugs like Patha etc. by their potency cure the disease first and then further act to promote the health. Hence those are also should be considered as Rasāyana.

It is to be noted that the effect of Rasāyana extend from Rasa Dhātu to Śukra Dhātu and even up to Oja. This Oja stands as the prime media between the physical and psycho-intellectual performances.



**Action of Rasāyana drugs under the following headings**

- Immune-modulator
- Anti-oxidants
- Adaptogenic

**Rasāyana vis-à-vis Immuno-modulators**

Rasāyana contain immune-modulators of varying chemical structures and molecular sizes. These exert their effect by modulating several steps of immune system such as activation of macrophages for enhanced generation, stimulation of cytotoxic activity and Phagocytosis, proliferation of lymphocytes leading to production and also cytotoxic induction of T- helper & natural killer (NK) cells and activation of complement pathways. Immuno-stimulants offer promise in enhancing antigen specific and non-specific immune response against infection.

Rasāyana, one of the important branch of Āyurveda, relates to therapy that may help in the treatment of physical and mental or psychological diseases or improve the body's resistance effect to illness. Rasāyana Dravya's are supposed to reverse death factor by controlling the ageing process which is the primary function, secondly to have preventive and curative effect on the disease conditions.

The plants used separately or in the form of compound preparations of Rasāyana dravya's which are elaborated in the therapeutic uses of most of the chronic disorders.

Immunoglobulin A: IgA is secreting in colostrums, saliva, tears, respiratory tract and intestinal mucosa. It forms a protective coating over mucous membrane and thus behaves as an antiseptic coat.

Immunoglobulin G: IgG class of immunoglobulin contains most of the antibacterial and antiviral protective antibodies that determine immunity against infection. It provides general immunity, but it is a secondary or recall immune response. Its ability to diffuse into body tissues facilitates combination and efficient elimination of antigen. Serum IgG crosses the placenta and at birth baby possesses high amount of IgG. However, infant produces it at about seven weeks of age.

Immunoglobulin M: IgM is having ten combining sites to destroy ten antigens at a time as well as it activates compliment fixation system. IgM is the major part of the early/primary response, especially in response to non-protein bacterial antigens. It readily fixes compliment, allowing for the efficient lysis of antigen

As mentioned earlier Ashwagandha significantly increases IgA, IgM and IgG. Mandukaparni significantly increases IgG and IgM. Varahikanda, milk and Shatavari significantly increase Serum IgA and IgM. Amalaki and Guduchi significantly increase the serum IgA. The implication of these findings on each of the immunoglobulin is being discussed here under separate heading.

#### Effect of Rasāyana Drugs on Immunoglobulin A:

Ashwagandha, Shatavari, Guduchi, Amalaki and Milk caused significant increase in the serum IgA levels of the patients. As mentioned earlier hence, these drugs may be very useful in prevention of diseases of Respiratory and GI Tract. They may also be used as Naimittika Rasāyana for the disorders of these systems.

Effect of Rasāyana Drugs on Immunoglobulin M:

Ashwagandha, Shatavari, Mandukaparni, Varahikanda, milk and Kapikacchu caused significant increase in serum IgM levels of the patients of this series.

IgM is having ten combining sites to destroy ten antigens at a time as well as it activates complement fixation system. Therefore, these drugs may be very useful as general immunity promotion drugs against the infections. It is further noticed that most of Rasāyana drugs caused increase in this immunoglobulin, which indicates the beneficial effect of these drugs in improving the general immunity.

Effect of Rasāyana Drugs on Immunoglobulin G:

Ashwagandha and Mandukaparni increased the serum IgG. As this immunoglobulin crosses the placenta, therefore these drugs may provide passive immunity to the child during the infancy period if administered to the mother during pregnancy. However, before such use, it is desirable to evaluate the safety profile of these drugs on the fetus.

On the other hand, the drugs like Atibala, Guduchi and Kapikacchu caused slight and insignificant decrease in the serum IgG level, so such drugs can be avoid during pregnancy. However these drugs may be useful in treating the auto-immune diseases due to the immuno-suppressive action of these drugs.

### Rasāyana vis-à-vis Antioxidants:

#### Free radicals and antioxidants - an overview

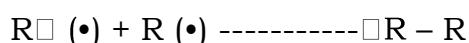
When all the medical researchers were scratching their heads for a plausible explanation regarding ageing process, a scientist hit the headlines with his new concept in mid 50s of the twentieth century which got worldwide attraction. This is nothing but '*free radical concept*' which, today, known to be involved in the Pathophysiology of as many as eighty diseases such as arthritis, atherosclerosis, cancer, etc.

#### **Free radicals:-**

Free radicals are atoms, ions or molecules that contain an unpaired electron. Thus, they become electrically charged because number of negatively charged electron does not match with positively charged protons. When a molecule loses or gains a single electron in its outer orbit, it becomes free radical. In fact, a free radical is defined as '*a molecule that can exist independently for a period of time with one or more unpaired electrons*'. Electron imbalance causes a free radical to seize an electron from surrounding molecules to form a complete pair. The donor molecule, by giving up an electron, may itself become a radical. The chain reaction thus triggered can damage cell membranes and lead to disease.



The reaction of one free radical with another free radical will, in general, terminate the chain of free radical reactions.



Conventionally, the radicals are denoted by dot (•). Oxygen is vital for aerobic life processes. In normal health, almost 98% of oxygen used by cells to burn food is converted into water by the mitochondrial cytochrome oxidase system. Rest of the oxygen that escapes from the

cells energy engines is converted into 'reactive oxygen species' (ROS) by univalent reduction of oxygen. Oxygen is frequently referred to as a 'reactive oxygen species' based on its ability to take on electrons (reduction) or to give up electrons (oxidation). ROS include not only O<sub>2</sub> centered radicals such as super oxide (O<sub>2</sub><sup>•-</sup>), hydroxyl (OH<sup>•</sup>), nitric oxide radical (NO<sup>•</sup>) and peroxy radical (RO<sup>•</sup>), but also some reactive non-radicals derived from O<sub>2</sub> such as hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), hypochlorous acid (HOCl), singlet oxygen (O<sub>2</sub>) and ozone (O<sub>3</sub>).

Thus, the cells under aerobic condition are always threatened with the insult of ROS, which however are efficiently taken care of by the highly powerful antioxidant systems of the cell without any untoward effect. When the balance between ROS production and antioxidant defense is lost, i.e., excessive production of ROS beyond the antioxidant defense capacity of the cell occurs, 'oxidative stress' sets in which through a series of events deregulates the cell physiology leading to various pathological conditions including cardiovascular dysfunction, neuro degenerative disorders, gastro-duodenal pathogenesis, metabolic dysfunction of almost all vital organs cancer and *premature ageing*.

The free radical mediated oxidative stress results in oxidation of membrane lipoproteins, Glyco oxidation and oxidation of DNA, subsequently cell death ensues. ROS from damaged cells also attack the adjacent cells, resulting ultimately in cell injury. Furthermore, cell injury itself has been reported to cause severe oxidative stresses leading to disorganization of cell structure and function<sup>37</sup>.

**Sources of free radicals (oxidants):**

There are mainly two sources viz. (1) Exogenous (ii) Endogenous.

Exogenous sources include air pollution (of which industrial waste and cigarette smoke are major contributors) radiation, drugs and pathogens. Trace metals, notably lead, Mercury, Iron and Copper are also major sources of free radical generation. Normal diets containing plant foods with large quantities of certain compounds such as phenols and even caffeine may contribute to the exogenous supply of oxidants to the body. Endogenous free radicals are produced in the body by different mechanisms.

First from is the normal metabolism of oxygen requiring nutrients. Mitochondria - the intracellular powerhouses which produce the universal energy molecule, adenosine Triphosphate (ATP) normally consume oxygen in this process and convert it to water. However, unwanted byproducts such as the super oxide anion, hydrogen peroxide and the hydroxyl radical are inevitably produced, due to incomplete reduction of the oxygen molecule. It has been estimated that more than 20 billion molecules of oxidants per day are produced by each cell during normal metabolism.

Second, white blood cells destroy parasites, bacteria and viruses by using oxidants such as nitric oxide, super oxide and hydrogen peroxide. Consequently, chronic infections result in prolonged phagocytic activity and increased exposure of body tissues to the oxidants.

Third, other cellular components called peroxisomes produce hydrogen peroxide as a byproduct of the degradation of fatty acids and other molecules. In contrast to the mitochondria which oxidize fatty acids to produce ATP and water, peroxisomes oxidize fatty acids to produce heat and hydrogen peroxide. The peroxide is then degraded by an enzymatic antioxidant called catalase.

Finally, an enzyme in the cells called Cytochrome P<sub>450</sub> is one of the body's primary defenses against toxic chemical ingested with food. However, the induction of these enzymes to prevent damage by toxic foreign chemicals like drugs and pesticides also results in the production of oxidant byproducts.

### **Free radicals and cell damage**

Reactive oxygen species can attack vital cell components like polyunsaturated fatty acids (PUFA), proteins, and nucleic acids. To a lesser extent, carbohydrates are also the targets of ROS. These reactions can alter intrinsic membrane properties like fluidity, ion transport, loss of enzyme activity, protein cross linking, inhibition of protein synthesis, DNA damage; ultimately resulting in cell death. Some of the well-known consequences of generation of the free radicals *in vivo* are. DNA strand scission, nucleic acid base modification, and protein oxidation and lipid peroxidation.

### **Lipid peroxidation:**

Free radicals in the presence of oxygen may cause peroxidation of lipids within plasma and organellar membranes. This can lead to a self-perpetuating process since peroxy radicals are both reaction initiators as well as the products of lipid peroxidation. Lipid peroxy radicals react with other lipids, proteins and nucleic acids, propagating thereby the transfer of electrons and bringing about the oxidation of substrates.

### **Free radicals and DNA**

ROS can cause oxidative damages to DNA, both nuclear and mitochondrial. The nature of damage include mainly base modification, deoxyribose oxidation, strand breakage and DNA protein cross links.

**Oxidative damage of proteins:**

During mitochondrial electron transport chain, free radicals are produced which can stimulate protein degradation. Oxidative protein damage may be brought by metabolic processes which degrade a damaged protein to promote synthesis of a new protein<sup>37</sup>.

**Antioxidant defense mechanism:**

Everyday approximately 20 million molecules of free radicals are produced. If these free radicals attack altogether, then living organism fails to exist. Each cell protects itself from damage by producing free radical scavengers such as enzymes that neutralize free radical. Thus, balance is maintained between free radical production and scavenging activity of enzymes. This is known as Antioxidant defense system.

Antioxidants are defined as '*substances whose presence in relatively low concentrations significantly inhibits the rate of oxidation of targets*'. Being present in serum, these antioxidants circumvent the damage caused by oxygen free radical. They consist of substances that provide the much needed stability to the free radical by allowing the pairing of electrons. Thus, they counteract the free radical attack.

**Types of antioxidant activity:**

It may be accomplished by three different mechanisms:

- 1) By inhibiting the generation of ROS.
- 2) By directly scavenging the free radicals by means of anti radical scavenging  
Enzymes such as SOD, catalase and glutathione peroxidase.
- 3) By raising endogenous antioxidant defenses i.e. unregulated expressions of the genes encodes the enzymes SOD, catalase or GSH – Px. This antioxidant defense system is basically of two types.



- (i) Primary defense
- (ii) Secondary defense

(I) Primary defense:

This is again subdivided into two types

- (a) Antioxidant nutrients
- (b) Antioxidant scavenging enzymes

- *Antioxidant nutrients:* Antioxidant defenses rarely on vitamins and minerals from the diet. These include beta carotene (precursor of Vit. A), Vitamin E ( $\alpha$ -tocopherol), vitamin C (ascorbic acid), selenium, zinc, manganese and copper.
- *Antioxidant scavenging enzymes:* Super oxide dismutase (SOD), catalase and peroxidase form defence system against ROS. While SOD lowers the steady state level of  $O_2$ , catalase and peroxidase do the same for  $H_2O_2$ .

(a) *Superoxide dismutase (SOD):* The first enzyme involved in the antioxidant defence. It is a metalloprotein found in both prokaryotic and eukaryotic cells.

(b) *Glutathione peroxidase:* It catalyses the reaction of hydro peroxides with reduced glutathione (GSH) to form glutathione disulphide (GSSG) and the reduction produce of the hydro peroxide. This enzyme is specific for its hydrogen donor,

(II) Secondary Defense:

In addition to the primary defense against ROS by antioxidant enzymes, secondary defense against ROS is also offered by small molecules which react with radicals to produce another radical compound, the 'scavengers'. When these scavengers produce a lesser harmful radical species, they are called 'antioxidants'

Since ROS mediated oxidative stress is now regarded as the major factor causing ageing and age related neuro-degenerative diseases, suitable antioxidant therapies to control these processes have already attracted worldwide attention in recent years. The pineal hormone, melatonin, having potent antioxidant activity is a potentially promising candidate for the control of ageing and other ROS mediated pathogenesis<sup>37</sup>.

Restricting the caloric intake has also been shown to delay ageing through (i) decreased production of mitochondrial O<sub>2</sub> and H<sub>2</sub>O<sub>2</sub> and (ii) increased production of antioxidant defenses, leading thereby to decreased production of oxidatively damaged proteins, lipids and DNA. Caloric restriction may thus decrease the oxidative stress and damage and may prolong life in humans.

Isolation of an antioxidant factor which is specific in its action, is nontoxic, and shows anti stress property, from the natural sources such as plants and the therapeutic application of such an antioxidant factor would perhaps be one of the better approaches to control the ROS mediated pathogenesis<sup>37</sup>.

### **RASĀYANA VIS-A-VIS ADAPTOGENS**

Majority of Rasāyana drugs were proved to have immunomodulatory property, anabolic effect and antioxidant properties. Recent advancement in the medical science is pointing toward another activity of such drugs and these are called adaptogenic property.

#### ***Adaptogens***

The concept of 'Adaptogens' was coined in 1947 by a Russian Scientist, Lazarev. He defined them as *"substances meant to put the organism into a state of non-specific heightened resistance in order to resist stresses and adapt to extraordinary challenges"*.

In general, Adaptogens are a group of medically effective substances that normalize body functions, strengthen systems and functions compromised by stress and have a protective effect against a wide variety of environmental and emotional stresses. General Adaptive Syndrome (GAS), formulated by Selye is a consistent, nonspecific response of the organism to stressful influences of totally diverse types, the adaptive reaction enables the body to heighten its power or resistance towards stresses, and to adapt to external conditions. Though difficult to differentiate adaptogenic effect from other remedies of related action, there are number of criteria which allow a formal arrangement of these other drugs in immunostimulants, nootropics, anabolic, tonics and geriatric acids. Rasāyana is certainly having any one or more of these activities. *Immune stimulants* are substances which bring about a heightened resistance through the stimulation of nonspecific defensive processes which are largely independent of antigens. *Nootropics (cognition enhances)* are effective psycho pharmacological agents which are said to improve the higher integrative brain functions, such as memory, learning, understanding, thinking and the capacity for concentration. No specific mechanisms are known. It is assumed that nootropics stimulate existing neural synapses to optimum performance (adaptive capacity) and also for damaging influences, such as disturbances of the energy and neurotransmitter metabolism or ischemia (protective capacity). *Anabolics* are substances which activate the anabolic metabolism. They promote the synthesis of nucleic acids and protein metabolism, thereby in general, growth. Tonics and geriatric remedies fall into the category of wellness enhances. Though a precise conceptual definition cannot be given for both, *tonics* are defined in a much generalized way as substances which mitigate conditions of weakness or lack of tone within the entire organism, or in particular organs. Being adaptogenic, like all the others, generally, adaptogens raise one's capacity, therefore may also be included by the group of tonics<sup>38</sup>.

*Geriatric remedies* are substances serving as a preventive treatment of old age diseases. Stiffness and age conditioned rigidity are possibly the outer manifestations of diminished or lacking ability to adapt.

Brekhman, in 1958, summarized the concept Adaptogens as follows:

- It must show a nonspecific effect (raising the power of resistance to toxins of a physical, chemical or biological nature).
- It is to normalize, independent of the type of pathological condition.
- It must be harmless and disturb the body functions as little as possible.

Accordingly, adaptogens are to strengthen the nonspecific powers of resistance to noninfectious stresses, raise the general performance capacity during stress situations and thereby prevent diseases that could develop due to over stress in the organism. It is seen as characteristic of adaptogens that their anti-stress effect towards stresses of a noninfectious variety, always stands in the foreground. Although in so-called adaptogens, immune stimulating, nootropic or metabolic effects have also been proved<sup>38</sup>.

By going through the aforesaid pages, it is certain that adaptogens show the similar qualities of Rasāyana i.e., Dhātuvrddhikara, Medhya, Pustikara, Balada, Dehendriya Drdhikarana, Brmhaniya, Jivaniya, etc. and thus help improve body's defense system.

**Pharmacology and Clinical Usefulness of Adaptogens<sup>39</sup>**

The term "adaptogens" is used to discuss a group of plants that have the ability to increase nonspecific resistance of the body to a wide range of chemical, physical, psychological and biological factors (stressors). The definition of an adaptogen was first proposed by Soviet scientists in the late 1950s — namely that an adaptogen is any substance that exerts effects on both sick and healthy individuals by "correcting" any dysfunction(s) without producing unwanted side effects. Adaptogens have the unique ability to switch from stimulating to sedating effects based on the body's needs.

Adaptogens may also help the body increase physical performance and enhance mental function. Some examples of commonly used plants having adaptogenic activity include:

- Rhodiola,
- Arctic root,
- Golden root (*Rhodiola rosea* L., Crassulaceae),
- Ashwagandha (*Withania somnifera* (L.) Dunal, Solanaceae)

The mechanism by which adaptogens work is associated with the stress-system (a function of the neuroendocrine/immune complex). Adaptogens affect the hypothalamus-hypophysis-adrenal cortex axis of the endocrine system, as well as the immune system and the central and sympathetic nervous systems. There are biochemical activators of the stress response (nitric oxide, catecholamines such as epinephrine and dopamine, and the inflammatory mediators termed leukotrienes, among others) and inhibitors of the stress response (corticosteroids, prostaglandin E2 or PGE2). There should be equilibrium among these biochemical in order for the organism to achieve what is termed homeostasis, or balance of all body systems and functions. Studies of the pharmacology of various Adaptogens in laboratory animals have revealed an increase in physical working capacity along with the stress-

*Evaluation Of The Rasāyana Effect Of Kruṣṇa Tila (Semen Sesami Nigrum)-A Clinical Study*

protective effects to a variety of potentially harmful factors including heat, skin burn, frostbite, irradiation, and heavy metal toxicity, among others. Adaptogens also have antioxidant activity and may be helpful in cardiovascular diseases, diabetes, various psychiatric conditions such as alcoholism and drug dependence, schizophrenia, and other neurological disorders. Adaptogens are useful agents and may offer some positive benefits as a general tonic for improved stamina and overall health, especially for stressful conditions, fatigue, concentration.<sup>39</sup>

All the above mentioned points can be summarized as below:

Rasāyana contains immune-modulators of varying chemical structures and molecular sizes. These exert their effects by modulating several steps of immune system such as activation of macrophages for enhanced generation, stimulation of Phagocytosis, proliferation of lymphocytes leading to production of t helper cells and activation of complement pathways. Immuno-stimulants offer promise in enhancing antigen specific and nonspecific immune response against infection.

Reservoirs of Balance and Intelligence

### **Rasāyana: Packets of intelligence<sup>40</sup>**

Ayurvedic herbal or mineral preparations used for promoting general health, immunity, strength, vitality virility and spiritual attainment are known as *Rasāyana*. These preparations are held to be mediators of balance and intelligence, a concept that explains their biological actions. The concept of biological information in modern science, for example as coded in DNA, has a counterpart in Āyurveda.

### **The principle of complementarities**

Veda is the most ancient literature's available-for the cosmos, including plants and animals. Out of this rises an important consequence: the principle of complementarities in Āyurveda explains that the sequence

*Evaluation Of The Rasāyana Effect Of Kruṣṇa Tila (Semen Sesami Nigrum)-A Clinical Study*

of biological information as stored in plants and minerals corresponds to the sequence of biological information in the human physiology. Rasāyana therapy utilizes this principle of complementarity to eliminate distortions and restore integrity to the flow of biological information and intelligence in the human physiology. Rasāyana function like small "tuning forks" that impart the proper resonant frequency and thus restore balance to the system. To use another analogy, Rasāyana can be seen as small packets of "software" that supply an essential program to restore integrity to the source code. Pharmacologists have identified sites on cell membranes, called receptors, to which small molecules, called ligands, such as hormones, neurotransmitters, and peptides can bind. Each molecule has a specific conformation and functions like a small key, fitting into the receptor site and activating another enzymatic reaction to produce its effect. It is widely held that many drugs and herbs act by fitting into the receptor site of naturally occurring hormones or neurotransmitters (called endogenous ligands), thus either inhibiting or mimicking their effects<sup>40</sup>.

### **Balance: the basis of stability**

When biological information is highly orderly and integrated, according to Āyurveda, the result is physiological "balance"--a state in which the parts of the organism are functioning in an integrated and harmonious state of equilibrium, rendering the organism as a whole both flexible and stable.

### **Rasāyanas: agents with multiple biological effects**

The results of research on Rasāyana confirm that Rasāyana have clinical effects on multiple disorders, suggesting that they act by strengthening the immune system and restoring balance in the physiology. This reaffirms the importance of using the whole plant in accordance with the descriptions of the classical Ayurvedic texts to

produce a balanced effect in the whole physiology. In contrast to this comprehensive approach of Āyurveda, modern science focuses its attention on identifying the "active ingredient," which frequently acts on an isolated aspect of the physiology and therefore often produces unwanted side effects. Research on Ayurvedic preparations has shown that traditional formulations often contain dozens of active receptor sites (e.g. the research on MAK4). The presence of such a wide variety of ligands suggests that the preparation may be acting on a wide variety of tissues through a number of different mechanisms.

This finding is not unexpected. Every plant contains thousands of various alkaloids, steroids, flavinoids, terpinoids and other molecules with bioactivity, and Āyurveda preparations may consist of many different plants. In addition, Āyurveda usually uses the entire part of the plant, for example, the whole fruit or leaf, and not just one constituent. It is therefore easy to see how Ayurvedic preparations such as MAK4 may contain many ligands<sup>40</sup>.

### **Nature: the most subtle resource**

The presence of many naturally occurring ligands in one preparation suggests that the preparations are balanced in the sense described above. In the case of Ayurvedic Rasāyana, this balancing is carried out by nature. To a botanical pharmacologist or phytochemist, the finding of such a wide variety of ligands to mammalian cell membrane receptors, which suggests an intimate relationship between plants and mammal neurochemistry, is indicative of the elegance, beauty, and harmony in nature<sup>40</sup>.



### AGEING (JARĀ)

Ageing is a complex phenomenon. Ageing is defined as a process that results in age-related rise in the death rate or failure rate.

Biologically ageing can be defined as the addition of complete changes that occur in the living organism with the time which leads to a decreased ability to tolerate day to day activities, functional disturbances and ultimately ending in to death. The most common Aging theories include Mutation, Accumulation and Antagonistic Pleiotropic theory, the two theories presume that aging is due to pleiotropic genes with beneficial early-life effects but deleterious late-life effects (antagonistic pleiotropic) or mutations with purely deleterious late-life effects (mutation accumulation). The aging of the world's population has major implications for medical care and health care systems. According to the United Nations, the number of people worldwide aged 60 years or older will increase from 1 in 10 currently to 1 in 5 by 2050. By 2050, the ratio of people aged 65 years or older to those aged 15–64 years will double in developed nations and triple in developing nations. This demographic shift compels us to deal with the changes associated with aging and the various anti-aging therapies<sup>41</sup>.

Aging is known as “Jarā” in views of Ayurvedic science. Aging or Jarā is defined as that which has become old by the act of wearing out “jīryati iti jarā”. “Vārdhakya” used as synonym of Jarā means increasing age<sup>50</sup>. The term *Jarā* is derived from the Sanskrit root “Jras vayohanau” state by Panini, which means loss in time of life span or shortening of life. The final stage of life has been considered to be as *Jarā*.

Āyurveda classifies stages of human life as —childhood (up to the age 16 years); youth and middle age [from 16 to 60 years (As per charak) or 70 years (As per Suśruta) which is further divided into progressively the traits of growth (vivardhamana, 16–20 years of age), youth (yuvana, 20–30 years), maturity (sampoornata, 30–40 years), deterioration (parihani, 40 years onwards) which gradually continues up to 60 years]; and lastly the old age, wherein after 60–70 years the body elements, sense organs, strength, etc. starts to decay<sup>51</sup>. Charak Ācārya mentions that the growth of an individual occurs up to 30 years after which it stops and process of ageing is initiated.

The word Prakriti has been devoted to the nature of an individual varies according to Desha, Kala, Prakriti and heredity and accordingly ageing may appear early, timely or late with less, moderate or more symptoms.

Suśruta Ācārya highlights list of naturally occurring diseases which are termed as Swabhavaja Roga's, like Kshuta, Pipasa, Nidrā, Jarā and Mrityu i.e. death. Suśruta Ācārya divides Swabhavaja Vyadhi's in two group's viz. Kalaja (occurring due to influence of time or natural) and second is Akalaja (unnatural). Based on this Jarā can be understood in two ways i.e. Kalaja Jarā and Akalaja Jarā.

### Natural aging

The Jarā appearing at or after the proper age defined for it. That means one person getting old age, after sixty or Seventy years is known as Kalaj Jarā. This type of Jarā is Pariraksanakrita, which means that it occurs at the proper age, after following the seasonal and daily routine described in Swasthavritta and use of Shodhana at proper time. This aging may be of less intensity and slow progressing and thus may not be very troublesome.

### Unnatural aging

When the signs and symptoms of Jarā are present before its prescribed time it is called as Akalaja Jarā. This type of Jarā is said to be due to Aparirakshanakrita, which means that it occurs before the prescribed age due to not taking the proper care of personal hygiene (Swasthavritta) and not getting Shodhana done at proper time. This type of ageing may be of greater intensity and rapidly progressing, if no care is taken to check it through proper treatment.

There is no medicine for Kalaja Jarā and considered as Yasya i.e. by the treatment with Rasāyana, the ill effect of ageing can be checked for some time and its progress may be slowed down or be halted to some extent. The second type i.e. Akalaja Jarā is curable and should be treated according to the Dosha and the complaints of the person.

According to Charaka the age above sixty years may be taken as old age, but Suśruta increases this limit to seventy years. This difference of Charaka and Suśruta may be due to the reason that every phenomenon has got its starting point at which it may not be very obvious but after some time when the phenomenon advances sufficiently its effects are clearly visible. In this way there is always a gap between the starting point and the complete manifestation of every phenomenon, which may be short and long depending upon the various conditions. For instance this gap is very short in acute poisoning and is long in the conditions like chronic poisoning (Gara Visha) etc.

In case of ageing the phenomenon generally progresses slowly and starts at the age of about sixty and its effects are quite visible at the age of seventy years. Charaka being a physician might have appreciated the changes of ageing at their starting point and therefore he has taken 60 years and above as the old age. On the other hand Suśruta might have thought it safer to take the limit of

ageing as 70 years when most of the symptoms of ageing are quite visible. Hence, premature ageing is that which occurs before the age sixty years.

Charaka has considered as by nature they are incurable or having no treatment. Chakrapani says ordinary treatment has got no effect on ageing. Rasāyana is the treatment of ageing as it has been clearly mentioned in Charaka that the old Cyavan Rishi became young after the use of Rasāyana.

Dalhanā explain that out of two types of ageing, the natural ageing is incurable and unnatural ageing can be treated with Rasāyana treatment.

Yapya is partial amenability of disease to treatments. Rather a person lives with the disorder without cure but without disturbed by the diseases if proper treatment is taken. It is said that in difficult stage, the disease recurs immediately after the treatment is withdrawn. This explanation goes in hand with the Chakrapani's commentary as noted above.

This means, a timely senescence can be manipulated with measurement by dietics and Rasāyana, so that its ill effects are controlled. Rasāyana is not the complete treatment for ageing, as it can just check or delay the process of ageing for some time, but it cannot be retarded and as soon as the effect of Rasāyana finishes the process of ageing starts again to march to the forward.

In Charaka Samhita it is stated that by using "Chyavanaprasha" in proper way and dosage Saint 'Chyavana' who was very old turned young. Further it is said that consumption of Chyavanaprasha not only eradicates the signs of old age (Jarākṛita Rupa) but also superimpose the youthful appearance.

Aging in all tissues

Another question arises here about the changes in to body tissues. Aṣṭāṅga Samgraha has mentioned some view about these Phenomena. Accordingly something is being lost at the end of each decade of life, beginning from birth. At the end of first decade childhood is gone, after second decade growth is stopped, after third decade luster is lost, in the fourth decade intellect starts declining and at the end of fifth decade skin's property is lost. Similarly at the end of sixth, seventh, eighth, ninth and tenth decades of life reproductive function, Vision, hearing), Mind; Sense organs and motor organs are lost respectively.

Table 2 - Changes In Every Decade Of The Life

<b>Decade</b>	<b>Sharangdhara Samhita</b>
1 <sup>st</sup>	Childhood
2 <sup>nd</sup>	Growth
3 <sup>rd</sup>	Complexion
4 <sup>th</sup>	Memory
5 <sup>th</sup>	Skin
6 <sup>th</sup>	Vision
7 <sup>th</sup>	semen
8 <sup>th</sup>	Valour
9 <sup>th</sup>	Intellect
10 <sup>th</sup>	Motor organs
11 <sup>th</sup>	Mind
12 <sup>th</sup>	Life

Hence, it can be stated that the changes in the body tissues are slow and continuous during whole life. The process of Aging according the Āyurveda begins at the fourth decade of life and the effect of Aging is more visible at the fifth decade of life where the skin changes are visible. And slowly this process affects to the other organs of the body.

**Table 3 - Signs of Ageing<sup>42</sup>**

Signs and symptoms	Charak	Suśruta	Ashtang sangraha	Ashtang hridaya	Madhav nidana
Dhatu kshaya	+	+	+	+	—
Indriya kshaya	+	+	+	+	—
Bala kshaya	+	+	+	—	+
Veerya kshaya	+	+	+	—	—
Utsaha kshaya	—	+	+	—	—
Oja hani	—	—	—	+	+
Vali	—	+	+	+	—
Palita	—	+	+	+	—
khalitya	—	+	+	+	—
Paurusha hani	+	—	—	—	—
Parakrama hani	+	—	—	—	+
Grahana dharana smaran hani	+	—	—	—	+
Vigyana hani	+	—	—	—	—
Vachana hani	—	—	—	—	—
Dhatu guna kshaya	+	—	—	+	—
Alparetas	+	—	—	—	—
Agni sada	—	—	+	—	+
Kasa	—	+	—	+	+
Svasa	—	+	+	—	+
Vaipathu	—	—	+	—	+
Slatha sara	—	—	+	—	—
Slatha mamsa	—	—	+	—	—
Prabha hani	—	—	+	—	—
Medha hani	—	—	+	—	+
Twak parushya	—	—	+	—	—
Chinta	—	—	—	—	+

Signs and symptoms	Charak	Suśruta	Ashtang sangraha	Ashtang hridaya	Madhav nidana
Krishta	—	—	—	—	+
Krodha bahulya	—	—	—	—	+
Kapha vridhicha gale nirantaram	—	—	—	—	+
Saktih, nisthivaneh sah nirgamo	—	—	—	—	+
Hasta-pada- kampa jiwha kampa	—	—	—	—	+
Vepathu	—	—	—	—	+
Murdha –skhalana	—	—	—	—	+
Pada-dvaya skhalana	—	—	—	—	+
Dhanurvata	—	—	—	—	+
Dehasyachtinamanam	—	—	—	—	+
Buddhi balyam jayeta	—	—	—	—	+
Prakritoatikharata	—	—	—	—	+
Vataamaya	—	—	—	—	+
Swalpa-shakti-avashishyat kleshma	—	—	—	—	+
Ativismanti	—	—	—	—	+
Dandashrayen – Gaman	—	—	—	—	+
Rad hinta-aassye	—	—	—	—	+

Jarā (ageing) is a naturally occurring disease. Charaka Ācārya explains as by nature Jarā is incurable or having no treatment. Chakrapani commenting on Charaka explains that ordinary treatment has no effect on ageing but Rasāyana is the means of controlling the ageing as in Charaka saṁhitā there's reference of the old Cyavan Rishi who became young after the use of Rasāyana.

Dalhanā, Commenting on Suśruta Samhita explains that, Kalaja Jarā is incurable whereas the Akalaja Jarā can be treated with Rasāyana treatment.



# DRUG REVIEW

**DRUG REVIEW****TILA (Seed)** <sup>43</sup>

Tila consists of dried seeds of *Sesamum indicum* Linn. (Fam, Pedaliaceae), a herb extensively cultivated throughout the plains of India upto 1200 m for its seeds.

**Synonyms**

Sanskrit : Tila

Assamese : Simmasim

Bengali : Tilagachh

English : Sesame, Gingelly-oil Seeds

Gujrati : Tall

Hindi : Tila, Teel, Tili

Kannada : Accheellu, Ellu

Malayalam : Ellu

Marathi : Tila

Oriya : Til

Punjabi : Til

Tamil : Ellu

Telugu : Nuvvulu

Urdu : Kunjad

**Description**

a) Macroscopic

Seed white, brown, grey or black, flattened ovate in shape, smooth or reticulate, 2.5 to 3 mm long and 1.5 mm broad, one side slightly concave with faint marginal lines and an equally faint central line; taste, pleasant and oily.

## b) Microscopic

Test of seed shows single layered palisade-like, thin-walled, yellowish coloured cells, and the rest of the testa composed of collapsed cells; endosperm 3 layered, rarely 2 layered, consisting of cellulosic polygonal cells of parenchyma containing fixed oils and small aleurone grains; cotyledons two, externally covered with thin cuticle; single layered epidermal cell, followed by a single row of palisade-like cells; rest of the tissues consist of polygonal, parenchyma cells containing fixed oil and aleurone grains.

Powder - Blackish coloured; shows palisade-like cells in surface view, parenchyma cells, aleurone grains and oil globules.

**Identity, Purity And Strength**

Foreign matter	Not more than	2	per cent, Appendix	2.2.2
Total Ash	Not more than	9	per cent, Appendix	2.2.3
Acid-insoluble ash	Not more than	1.5	per cent, Appendix	2.2.4
Alcohol-soluble extractive	Not less than	20	per cent, Appendix	2.2.6
Water-soluble extractive	Not less than	4	per cent, Appendix	2.2.7
Fixed Oil	Not less than	35	per cent, Appendix	2.2.8

**T.L.C.**

T.L.C. of alcoholic extract on Silica gel 'G' plate using Toluene: Ethylacetate (9 : 1) shows under UV (366 nm) three fluorescent zones at Rf. 0.57, 0.64 (both light blue) and 0.72 (blue). On exposure to Iodine vapour five spots appear at Rf. 0.08, 0.57, 0.64, 0.72 and 0.94 (all yellow). On spraying with Vanillin-Sulphuric acid reagent and heating the plate for ten minutes at 110 ° C seven spots appear at Rf. 0.08, 0.57, 0.64, 0.72 (all violet), 0.76, 0.84 (both light violet) and 0.94 (violet).

**Constituents - Fixed Oil****Properties And Action**

Rasa : Madhura, Tikta, Kashaya, Katu

Guna : Guru, Snigdha, Sukshma, Vyavaya

Virya : Ushna

Vipaka : Madhura

**Karma :**

Snehana, Svarya, Snehopaga, Balya, Vjtaghna, Kushtakara, Pittala, Vibandhaka, Mutrabandhaka, Medhavardhaka, Agnivardhaka, Samgrahi, Kesya, Avasadakara, Kesa krsnakara, Kesa Vardhaka, Karnapalivardhaka, Kaphakopaka, Mrudurecaka, Vrana Samsodhaka, Vrana Pachaka, Vrana Dahanasaka, Bhagna Prasadaka, Rasayana, Vishaghna, Vajikara, Varnya, Agnibala Vardhaka

**Important Formulations -**

Jatiphaladi Churna, Narasimha Churna, Haridradi Lepa, Vrusya Pupalika Yoga, Nagaradi Yoga, Tiladi Upanaha, Tiladi Yoga, Priyaladi Yoga, Mustadi Upanaha, shunthyadi Churna, Pathyadi Gutika, Hingvadi Yoga, Paniya Kshra, Bhallatakadi Modaka

**Therapeutic Uses -**

Udavarta, Yonishula, Gulma, Udara, Anaha, Shira shula, Parasava shula, Amashula, Raktarsha, Gudabhrmsha, Kasa, swasa, Pravahika, Visarpa, Hikka, Pinasa, Vatarakta, Pradara, Ashmari, Nadi Vrana, Kushtha, svitra, Granthi, Upadamsha, Vidaraka, Alasa, Khalitya, Palitya, Akshiroga, Pratishyaya, sankhaka, shakuni Graha, Kumara, Kshaya, Krumi, Mutraghata, Dantaroga, Dantaharsha, Vatika Mukharoga, Atidagdha, Trusna, Pliharoga, Galaganda, Karnapali shotha

DOSE - Powder 5-10 gm/day.

The most comprehensive & basic manuscript related to the Traditional Chinese medicine (TCM) i.e. Materia Medica explains about black sesame as “Taking black sesame seeds can heal all the chronic illness after 100 days, improve skin tone on body and face after 1 year, reverse gray hair after 2 years, and regrow teeth after 3 years.”

Sesame is probably the oldest reported oil plant to the mankind. Open Sesame! The magic phrase from the age-old tales of ‘Ali Baba and the Forty Thieves’ opened the cave hiding the treasure of the forty thieves. The phrase highlights the fact that sesame was a valuable commodity in those days.

One of the first oil seeds known, sesame seeds are used in cooking as well as in traditional medicines for their nutritive, preventive, and curative properties.

Today Kruṣṇa Tila (black sesame seeds) is only “remembered” in religious ceremonies, neglecting the medicinal values in health promotion and preventive aspects of consuming black sesame seeds.

Many Chinese references with relation to consuming of Kruṣṇa Tila (black sesame seeds) for achieving long life and health benefits even at the old age are very famous.

The relationship of the Kruṣṇa Tila (black sesame) with long life is similarly seen in early Indian traditions and classical writings like Veda’s and traditional Indian medicinal references (Ayurvedic classics), where the black sesame seed is considered a symbol of immortality and having rejuvenating qualities. Sesame oil mills are reputed to be magical places. Folklore beliefs suggest they are home to numerous spirits.

Various studies carried on the nutritional values of the Kruṣṇa Tila (black sesame seeds) has provided encouraging evidences which are supportive to the Chinese references for the use of the Kruṣṇa Tila (black sesame) for its anti-aging property.

The Kruṣṇa Tila (black sesame seeds) are rich in plenty of micro nutrients like vitamins B and iron, deficiencies of which are linked with the premature graying of hair, impairments in thinking or memorizing and hearing impairment. Kruṣṇa Tila (black sesame seeds) is also rich in other elements like calcium and zinc, which are important minerals associated with maintaining strength of the bones and thereby preventing diseases related to bones like osteoporosis etc<sup>44</sup>.

The seed also contains substances known as sesamin and sesamolin, which are found to increase vitamin E supplies (important for skin health) and lower cholesterol levels. This review deals with understanding the qualities and benefits of black sesame seeds.

**Scientific Classification:-****Botanical Source:** Dry Seed of *Sesamum indicum* L**Latin Name:** *Semen Sesami Indici***Family:** Pedaliaceae**Genus:** *Sesamum***Species:** *S. indicum***Synonyms:** Benne Seed.**Eng.** - Sesame, Gingelly. Hindi- El, Gingli.**Beng.** - Sanki til, Khaslatil, Raktatil, Til, Bhadutil, Krishna til, Kala til.**Guj.** - Tal.**Kan.** - Ellu, Wollelu, Achchellu, Valle-yanne, Yallu.**Mal.** - Ellu, Schit-el, Mimakbijan, Nallenna, Karelluchitrallu, Karuthellu.**Mar.** - Til, Tila.**Punj.** - Til, Tili, Kunjad.**Tam.** - Ellu, Nal-lenny, Yellu-cheddie, Nuvvulu, Ellu-cceti.**Tel.** - Nuvvulu, Nuvvu, Manchi-nune, Pollanuvvulu.**Arab.** - Shiraj, Duhn.**Oriya.** - Rasi, Khasa.**Pers.** - Roghen, Kunjed, Kunjad, Roghanekunjad, Roghaneshirin.**Santhal.** - Tilmin, Kat.**Sing.** - Tun-pattala, Tel-tala, Talla-atta.

Black Sesame is the dried ripe seed of *Sesamum indicum* L. (Fam. Pedaliaceae). It spread through human intervention from East Africa to North Africa and eastwards to India and China. All cultures gave it names that sound similar to sesame; for example in Arabic it is called *simsim*, in Aramaic *sums ma* and in Greek *sesamon*. It is likely that the name refers

to sesame as an oil plant: the Accadian word *šamaššammū* could be made up of *šamnu* = oil, fat and *šammum* = plant.

### **Botanical Description:-**

Probably originating in Asia, the Chinese used it 5,000 years ago, to make soot for the finest Chinese ink blocks. Records suggest cultivation of sesame in parts of India around 1600 BC. From there it was brought to Europe, grown in Egypt, and its value both medicinally and for cooking gradually spread throughout Europe.

Sesame grows best in sandy well-drained soil and a hot climate with moderate rainfall.

Sesame is an erect annual plant that can grow to a height of two meters. It bears elongated oval leaves on a stem which can be branched or unbranched, depending on the variety. Approximately six weeks after sowing, the sesame plant develops furry, tubular flowers reminiscent of a cornucopia in shape. The flowers can be white, yellow, pink or violet. They may be speckled and grow in groups of three in the leaf axils.

The flowers are usually self-pollinated and in most cases only the middle fruit of the group fully ripens. The long taproot has many lateral roots. The plant is native to tropical and subtropical regions and needs much warmth and moisture for its growth and dry weather for the seed to ripen. When the seed capsules have turned brownish black they burst and release the ripe seeds, which may be white, light brown or black, again depending on the variety

The fruit, about 2.5 cm long, is an oblong capsule with small seeds. Each plant may grow 15-20 fruits, which contain 70-100 seeds each. Plants and fruits will reach maturity in 80-100 days after sowing.



The seeds of Kruṣṇa Tila (black sesame) are flat ovular in shape, measuring approximately 3mm in length and around 2mm width. Surface of Kruṣṇa Tila (black sesame) is dusky and smooth. The tip of the seeds has punctate hilum. Coating of the seeds is thin consisting of two cotyledons, which are white, and rich with oils in it. It has sweet taste, and aroma similar to oils.

Tila (sesame seeds) has commonly found two varieties used in different parts of the world i.e. black sesame seeds and white sesame seeds. Both of them having almost similar chemical composition. White sesame seeds are supposed to be better for edible purpose and the black sesame seeds are preferable for use of medical conditions.

### **Culinary uses:-**

In Manipur (India) black sesame is used in the preparation of *Thoiding* and in *Singju* (a kind of salad). Thoiding is prepared with ginger and chili and vegetables are used in the spicy Singu dish.

In Assam, black sesame seeds are used to make *Til -Pitha* and *Tilorlaru* (sesame seed balls) during bihu.

In Japan whole seeds are found in many salads and baked snacks and tan and black sesame seed varieties are roasted and used to make the flavouring gomashio. *Gomashio* is also a part of the macrobiotic diet, where it is used as a healthier alternative to ordinary salt.

### **Chemical Composition:-**

Chemical constituents in Kruṣṇa Tila (black sesame seeds) is - around 55% oils, sesamin, sesamolin, sesamol (3,4-methylenedioxy-phenol), Fatty oils are mainly composed of 48% of oleic acid, 37% linoleic acid, palmitate

acid, stearic acid, archidonic acid, and glycerol etc. which are supposed to poses antioxidant effects on the body.

Kruṣṇa Tila (black sesame) also contains vitamin E, B-complex vitamins (especially niacin), phytosterols, proteins, sucrose, saccharides, sesamose, and trace amount of phosphorus, potassium and cytochrome C. Kruṣṇa Tila (black sesame) contains folic acid, nicotinic acid, planteose, pentosan and rich source of calcium.

Around 100gm Kruṣṇa Tila (black sesame seeds) provides approximately 1.5 mg. or 74% of the DV, for copper, and 2.8 mg i.e. 19 percent of the DV for zinc. Kruṣṇa Tila (black sesame) is supposed to have highest phytosterol content i.e. around 400 to 412 mg per 100 grams of seeds. Kruṣṇa Tila (black sesame seeds) are very good source of calcium, which has been proved through various studies across the globe. One gram of Kruṣṇa Tila (black sesame) seeds contains approximately 85 mg. of calcium in it.

### **Pharmacological Activities:-**

Based on Chinese Materia Medica, it is sweet in flavor and neutral in properties. It covers three meridians of liver, spleen, and kidney. Based on theories in Traditional Chinese Medicine (TCM), it is believed that aging, the toils of life and worrying could bring about deficiencies in bodily functions. In particular, the “Liver” and “Kidney” come to be deficient in “Jing” and “Blood”. This deficiency in turn brings about aging-related symptoms like blurry vision, graying of hair, ringing in the ears, as well as weakness in the bones and joints. Black sesame provides the nutrients needed to correct such a “Liver-Kidney” deficiency, helping the body to delay the onset of aging-related symptoms, also reversing the symptoms after they arise. The content of vitamin E contained in this black sesame

is the highest in all foods of plant origin. Vitamin E can promote cell division and delay cell senescence which is well understood. Long-term use can counteract or neutralize the accumulation of cell senescence substance of “radicals” and then delay aging and extend life expectancy. Vitamin E is also associated with healthy skin<sup>45</sup>.

The Chinese believe that the nutrients in black sesame seeds can help to correct a bodily deficiency (in *Ying* and *Xue* of the *Gan* and *Shen*) brought about by aging, worrying and the toils of life, which in turn bring about aging-related symptoms like graying hair, blurry vision and ringing in the ears.

Sesame seeds are rich in substances known as sesamin and sesamolin, which can help lower cholesterol levels. The black sesame seeds also contain magnesium, which help to reduce blood pressure. Black sesame seeds are rich source of phytosterols which are the plant compounds similar to chemically the structure of cholesterol. Intake of phytosterols in routine diet helps reduce cholesterol levels in the blood and also decrease the risk of development of cancers. The fatty oils present in the Kruṣṇa Tila (black sesame) helps lubrication of intestines which in turn is beneficial in relieving signs of constipation. These substances are from group of fibres called lignans, which are rich in dietary fibre and have a property of lowering cholesterol. The fibres, lignans and other nutritional contents (e.g. phytosterol, calcium etc.) present in the Kruṣṇa Tila (black sesame seeds) poses protective effects against the cancers, specifically colon cancer. The sesamin present in Kruṣṇa Tila (black sesame seeds) is supposed to have protective action on the liver against the damages caused by the free radicals<sup>46</sup>.

Magnesium (Mg) and calcium (Ca) are essential minerals which help in regulation of blood pressure, reduce the chances of developing stress and

migraine (triggered by spasms in blood vessels), reduce the spasms in asthma patients and regularize sleep patterns, especially menopause induced sleep disturbances.

Calcium and zinc present in black sesame seeds can help nourish the bones thereby preventing osteoporosis. The black sesame seeds are rich in B vitamins and iron, deficiencies of which can lead to the premature graying of hair, loss of memory and hearing impairment.

### **Few researches on black sesame**

- a. A randomized, placebo-controlled human study of chemical weapons injured patients found that boiled water extracts of black sesame seed reduced respiratory symptoms, chest wheezing, and pulmonary function test values, as well as reduced the need for drug treatment.
- b. Animal research has found that black sesame seed oil has significant inhibitory effects against colon cancer in rats, without observable side effects.
- c. A study, in human subjects, found that boiled water extracts of black sesame seed have relatively potent antiasthmatic effect on asthmatic airways.
- d. A study on 35 opiate addicts found black sesame seed as an effective therapy in long-term treatment of opioid dependence.

### **Dosage:-**

The typical dosage of black sesame seeds is 9-30 grams per day, ground into a powder and taken alone or in combination with other herbs.

**AYURVEDIC REVIEW:-**

The classical texts of Ayurveda have described medicinal properties of sesame. It is known as “tila” in Sanskrit, “til” in hindi. Ayurveda classics describe three varieties of sesame based on colour of seeds. They are “Raktha (red), Kruṣṇa (black) and shweta (white)”. Kruṣṇa Tila or black sesame seeds are considered to have excellent medicinal properties and are recommended in Ayurveda for treatment purpose and as a rejuvenating drug.

**Qualities of Kruṣṇa Tila (black sesame)**

Rasa : - Madhura, Katu, Tikta

Guna : - Guru, Snigdha

Veerya : - Ushna

Vipaka : - Madhura

**Properties:**

Acharya Charak has mentioned properties of Tila as which promotes longevity and preserves youth; strengthens the body and boosts its resistance.

Acharya Sushruta has highlighted Tila taila (sesame oil) as one of the best amongst all herbal oils and described it as Brmhana – bulk promoting, Suksma (subtle), Prinana (endows satiety), Vrishya (aphrodisiac), Tvakprasadana (skin tonic), Medhya (enhances retention power).

As per Bhavaprakash Nighantu the chief properties of tila oil are a hair tonic, galactagogue, an appetizer general tonic, digestant and it is used in skin diseases, wounds, anorexia and dental diseases.

In Vagbhata Samhita (Ashtanga Samgraha & Ashtanga hridaya), use of Krushna Tila (black sesame seeds) has been indicated for the purpose of Rasayana. Under the description of various Rasayana dravyas (drugs), Acharya vagbhata mentions about the use of Kruṣṇa Tila i.e. black sesame seeds as rejuvenating drug, regular use of which along with water helps in nourishing the body and thereby strengthening the teeth's.

दिनेदिने कृष्णतिलप्रकुञ्चं समश्रुतां शीतजलानुपानम्।

पोषः शरीरस्य भवत्यनल्पोद्वीभवन्त्यामरणाञ्चदन्ताः॥

अष्टाङ्गहृदये (उत्तरस्थानम्) ३९/१५८

**Figure 1, 2, 3:- Plant – Krushna tila (black Sesame)**



**Figure 1**



**Figure 2**



**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6**

**Figure 4, 5, 6:- krushna tila - Black Sesame Seeds**

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# METHODOLOGY

## **METHODOLOGY**

A healthy and long life has been an utmost desire of every human being. There has been an enormous effort by various scientists and researchers in searching alchemy for immortality.

Ayurveda a non-human medical science supposed to be evolved by god himself and passed the knowledge to humans by them, is one of the oldest known healing sciences to mankind. Ayurveda has dealt with promotion and preservation of health of a healthy individual as the first priority, where in Rasayana therapy has been explained. Rasayana therapy helps to prevent the diseases by enhancing the overall bodily defense mechanism by producing top quality structural and functional entities.

Rasayana therapy explained in Ayurveda is a specialized stream of medication for immunity enhancer, anti-degenerative and rejuvenative health care which is supposed to prevent the effects of ageing and improving the quality of life of healthy person as well as diseased.

Krushna tila i.e. black sesame is supposed to one of the dravya (drug) bearing Rasayana properties. Black sesame has been used worldwide especially in Middle East, china, japan and Indian sub-continent as a inseparable part of their diet. To analyze the Rasayana properties of Krushna tila the present study was undertaken.

### **Design of the study:**

A clinical study with pre-test and post-test design where in 100 patients fulfilling the inclusion criteria of either sex between the age group of 40 to 60 yrs were selected for the study.

### **Source of Data**

The source of collection of the patients was from OPD of Bharati Vidyapeeth Medical Foundation's Ayurveda Hospital, Pune- 411043

### **Literary source:**

All the Ayurvedic, modern literatures and contemporary texts including the journals, publications, websites etc. were reviewed and documented for the intended study.

### **INTERVENTION:**

Sample size	: 100 patients
Drug	: Krushna Tila
Dose	: 10 gram once daily to be chewed at Rasayana kala (Morning) empty stomach
Methods	: Oral administration
Anupana	: Sheeta jala (normal water at room temperature)
Duration of the treatment	: 90 days
Total period of study	: 90 days

The research work included 100 patients based on the selection criteria mentioned in the protocol approved by ethics committee. The research drug i.e. Kruṣṇa Tila (semen sesami nigrum) was administered to the patients enrolled for the study in the dose of 10 gm daily morning empty stomach with water (at room temperature) for a total duration of 90 days.

**Observation period:**

Patients were observed before treatment, on 15<sup>th</sup>, 30<sup>h</sup>, 60<sup>th</sup>, 90<sup>th</sup>, day to assess the progress.

Total study duration including follow up: 90 days.

**Inclusion criteria:**

1. Individuals between 40 to 60 yrs of age were included.
2. Individuals having complaints of Karshya, early ageing signs, general debility, minor health complaints related to Asthi dhatu were included.
3. Individuals of both the sex were included.

**Exclusion Criteria:**

1. Individuals with any systemic disorders were excluded.
2. Pregnant women were excluded.
3. Individuals undergoing any other therapy or secondary cases of karshya etc. were excluded.

## **ASSESSMENT CRITERIA:**

### **Objective Parameters**

1. WEIGHT

2. Height

3. *QUETELET'S INDEX (devenport-kaup's adaptation) / BMI*<sup>47</sup>

Quetelet's index (QI) represents a measure of nutrition status. It is calculated according to a formula:

$$QI = BW / BH^2$$

where BW means body weight (g) and BH body height (cm). People with normal nutritional status have QI values between 2.15–2.56.

4. *MUSCLE INDEX*<sup>47</sup>

Muscle index (MI) is an orientation method about someone's muscle development. It is calculated according to a formula:

$$MI = ((CCB - CRB) / CRB) \times 100,$$

where CCB means circumference of the upper arm during an isometric contraction of muscle biceps brachii at 90° of elbow flexion (cm) and CRB circumference of the upper arm in relaxed position of muscle biceps brachii at 90° of elbow flexion (cm). Values between 5–12 are normal, values under 5 represent obese subjects with weak muscles and values over 12 represent people with strong muscles.

### 5. LORENZ'S CONSTITUTIONAL INDEX<sup>47</sup>

Lorenz's constitutional index (LKI) gives information about body's components with a following formula:

$$LCI = CT - CA - 14,$$

where CT means circumference of thorax (cm) and CA circumference of abdomen (cm). If a calculated value is a positive, than an increase in a body mass goes on the account of muscles and bones. On contrary, if it's a negative then the adipose tissue is responsible for an increased body mass.

### **Subjective Paramters**

#### **Abhyavaharan Shakti**

Normal intake of food	-----	0
Eats 25% less than normal diet	-----	1
Eats 50% less than normal diet	-----	2
Eats 75% less than normal diet	-----	3

#### **Jāraṇa Shakti: scoring according to Jeerna Ahara Lashana**

(Udgara shudhi, Utsaha, Vega Pravrutti, Laghuta, Kshuth, Pippasa)

Presence of all symptoms	-----	0
Presence of all 4 symptoms	-----	1
Presence of all 3 symptoms	-----	2
Presence of all 2 symptoms	-----	3
Presence of all 1 symptoms	-----	4

**Nidrā**

Normal sleep for 7 – 8 hrs / night	-----	0
Sleep for 5 – 6 hrs / night	-----	1
Sleep for 4 – 5 hrs / night	-----	2
Sleep for 3 – 4 hrs / night	-----	3

**Twak parushata (dryness of skin)**

No dryness	-----	0
Scratches can be made on the skin	-----	1
Skin looks dry but not cracked	-----	2
Skin looks dry with cracked	-----	3

**Slatha asthi (bone weakness)**

No bony pain	-----	0
Occasionally bony pain on pressure	-----	1
Often discomfort and bony pain during slight exertion	-----	2
Dull aching pain even at rest	-----	3

**Slatha sandhi (flaccid joints)**

No pain in joint	-----	0
Occasionally feels pain & cracking sound in joint during movement	-----	1
Often feels pain & cracking sound in joint during movement	-----	2
Always feels pain & cracking sound in joint during movement	-----	3



### **Khalitya (hair fall)**

No hair fall	-----	0
Hair fall notice only while combing in morning	-----	1
Hair fall always during combing	-----	2
Visible baldness	-----	3

### **Follow Up Of the Study**

Participants were observed before treatment and detailed case report using the case proforma formulated for the study was taken.

Participants were asked to report after every 15 days from the starting of the course of the study i.e. on 15<sup>th</sup>, 30<sup>th</sup>, 60<sup>th</sup> & 90<sup>th</sup> day after commencement of the research to assess the progress.

Total study duration including follow up was 90 days.

# **OBSERVATION AND RESULTS**

## OBSERVATION & RESULTS

A clinical study was conducted in 100 patients who fulfilled the inclusion criteria. Each and every case was studied as per age, sex, socio-economic status, religion, occupation, etc. All the data is presented in the form of tables. Assessment criteria's i.e. Signs and symptoms are studied for improvement in individual factors and the results were subjected to statistical analysis.

Total 113 patients were enrolled in the study out of which 100 patients completed study of which the data is as follows.

**Table 4 - Showing Age wise distribution**

Age group	Number of Patients	%
40-45	39	39 %
45-50	29	29%
50-55	23	23%
55-60	09	09%
Total	100	

Among 100 patients, 39 patients [ 39 %] were in the age group of 40-45 years, 29 [ 29 %] patients were in age group of 45-50 years, 23 patients [ 23 % ] in the age group of 50-55 years and in 55-60 there were 09 [ 09 %] patients.

**Table 5 - showing the sex ratio**

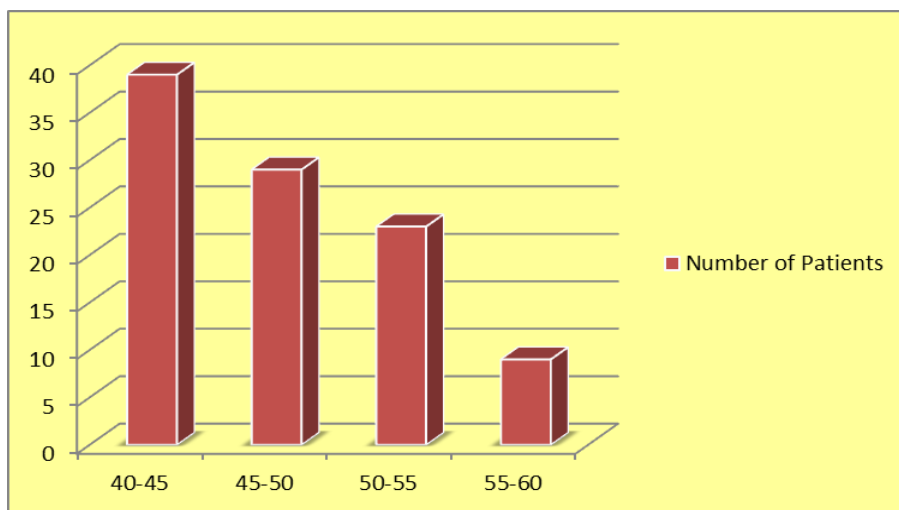
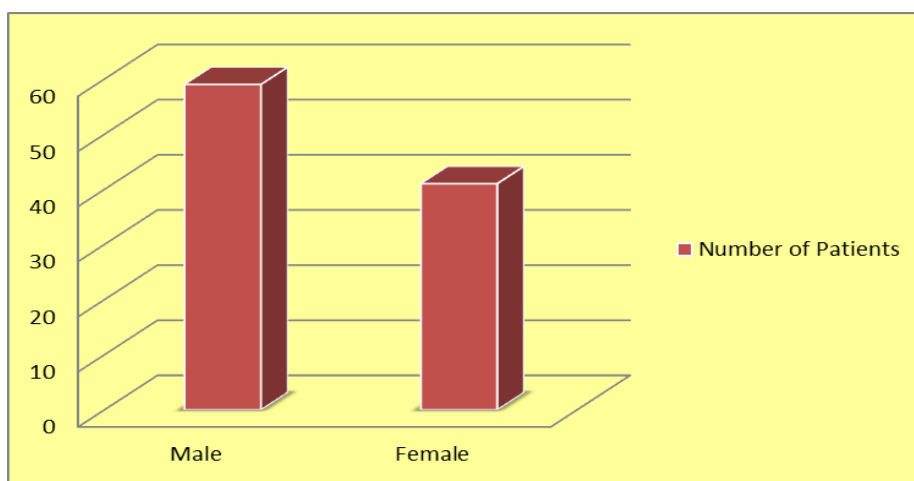
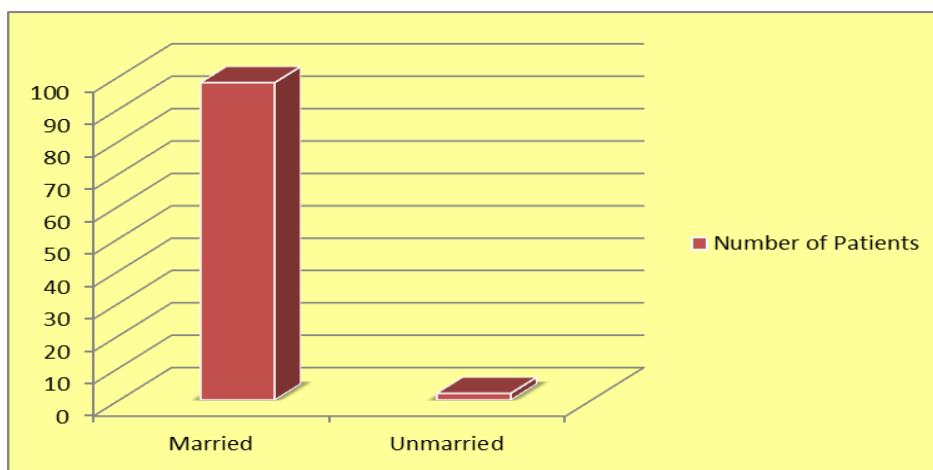
<b>Sex</b>	<b>Number of Patients</b>	<b>%</b>
Male	59	59 %
Female	41	41 %
Total	100	

Out of 100 patients 59 [59 %] patients were male and 41 [41 %] patients were of female sex.

**Table 6 - showing the marital status**

<b>Marital Status</b>	<b>Number of Patients</b>	<b>%</b>
Married	98	98 %
Unmarried	02	02 %
Total	100	

In this series out of 100 patients 98 [98 %] were married and 02 [ 02 %] were unmarried.

**Chart no. 01 Showing Age wise distribution****Chart no. 02 showing the sex ratio****Chart no. 03 shows marital status wise distribution**

**Table 7 - showing diet patterns**

<b>Type of food</b>	<b>Number of patients</b>	<b>%</b>
Vegetarian	33	33 %
Mixed	67	67 %
Total	100	

Out of 100 patients 33 [33 %] patients were taking the vegetarian diet; 67 [67 %] patients were accustomed to the mixed diet.

**Table 8 - Distribution according to Socio-Economic Status**

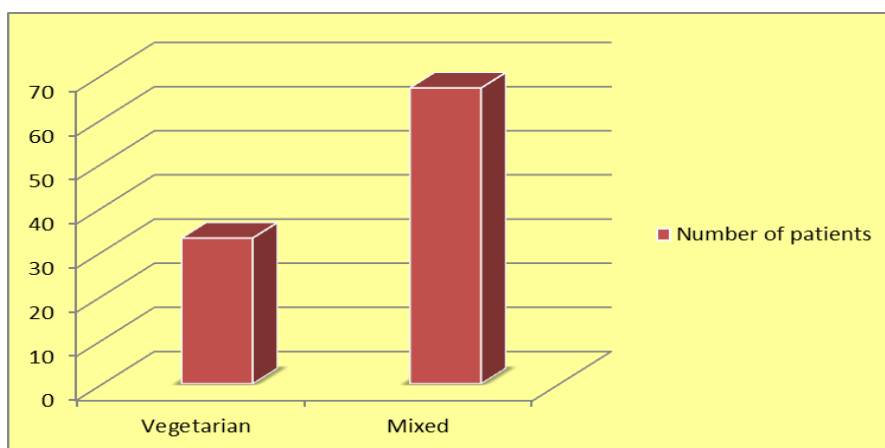
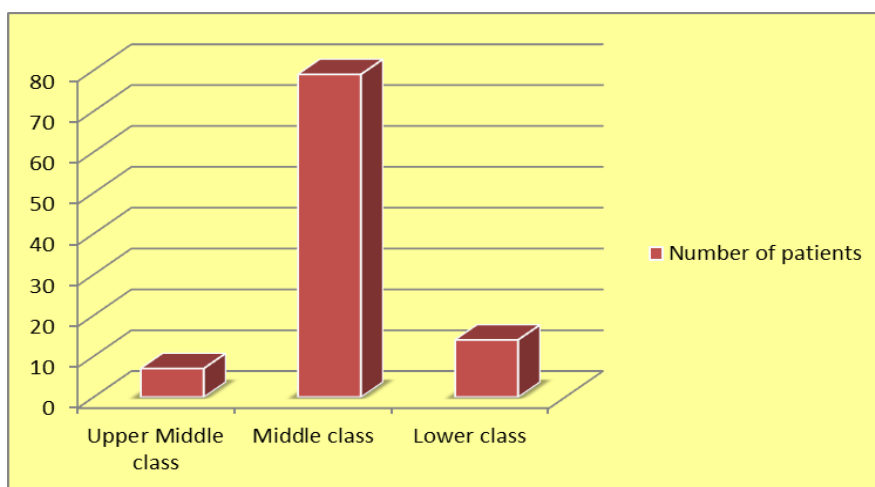
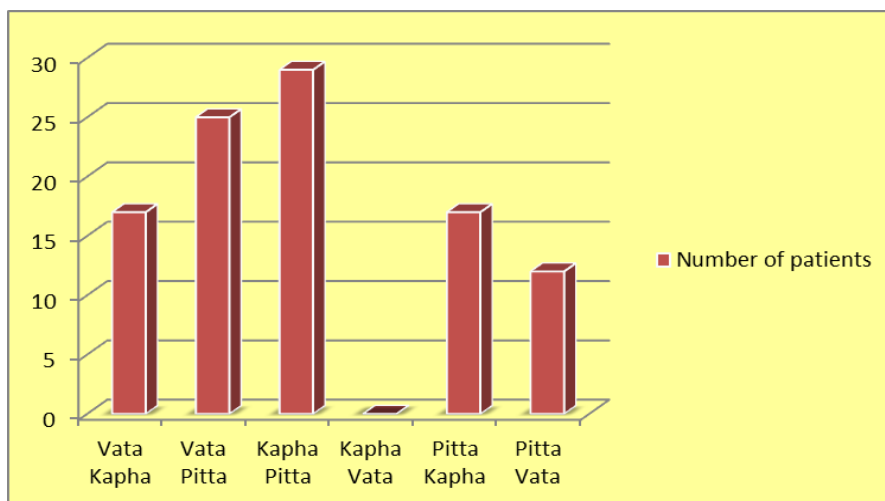
<b>Socio- economic status</b>	<b>Number of patients</b>	<b>%</b>
Upper Middle class	07	07 %
Middle class	79	79 %
Lower class	14	14 %
Total	100	

**Socio-Economic Status:** Socio-economic status wise distribution of patients showed that maximum of 79 [79 %] belonged to middle class followed by 14 [14 %] belonged to lower class, 07 [07 %] belonged to upper middle class.

**Table 9 - showing Distribution of patients according to the Prakriti**

<b>Prakriti</b>	<b>Number of patients</b>	<b>%</b>
Vata Kapha	17	27 %
Vata Pitta	25	25 %
Kapha Pitta	29	19 %
Kapha Vata	00	00 %
Pitta Kapha	17	17 %
Pitta Vata	12	12 %
Total	100	

Out of 100 patients of this series 12 [12 %] were of Pitta -Vata Prakriti; 25 [25 %] were of Vata-Pitta Prakriti, 29 [29 %] were of Kapha-Pitta Prakriti; 17 [17 %] were of Pitta-Kapha Prakriti and Vata-Kapha Prakriti each.

**Chart no. 04 showing diet patterns****Chart no. 05 showing distribution acc. to Socio-Economic Status****Chart no. 06 showing Distribution of patients acc. to the Prakriti**



**Table 10 - Showing patients based on the occupation**

<b>Occupation</b>	<b>Number of patients</b>	<b>%</b>
Business	14	14 %
House wife	27	27 %
Teacher	12	12 %
Agriculture	07	07 %
Officer	31	31 %
Others	09	09 %
Total	100	

Depending upon the occupational distribution 27 [27 %] were accustomed to the house work; 14 [14 %] were in the business; 07 [07 %] to the agriculture work; 31 [31 %] were of office work; 12 [12 %] were teachers; 09 [09 %] were in others category.

**Chart no. 07 showing Distribution of patients according to the Occupation**

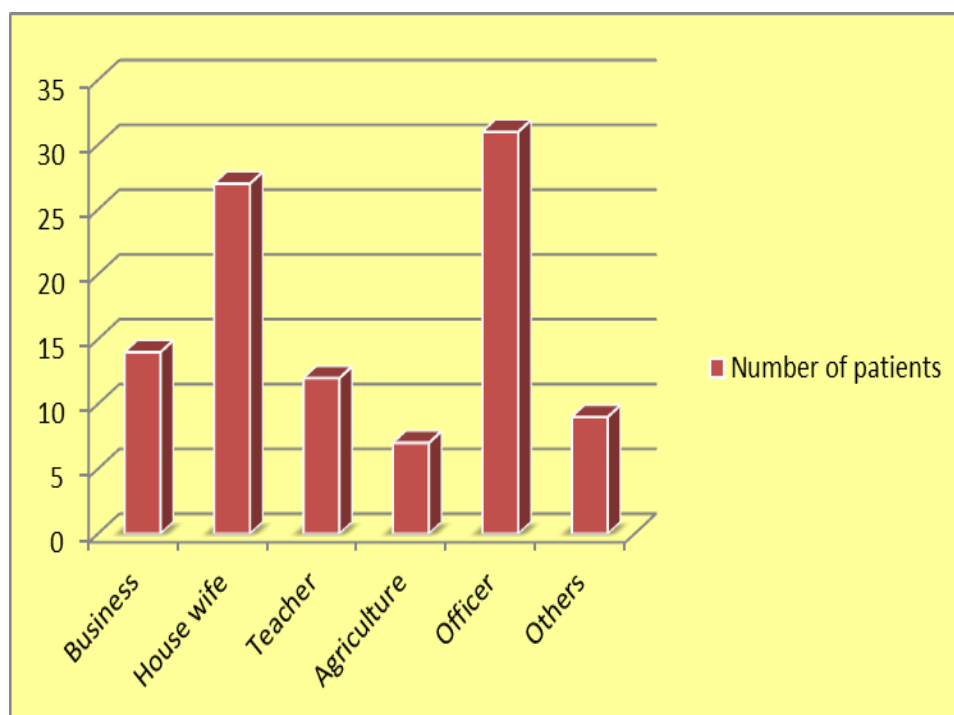


Table 11 - showing results of the patients according to Abhyavaharan shakti

	Results of Abhyavaharan shakti
Mean BT	1.5667
Mean AT	0.562
Mean difference	1.0047
% of improvement	64.12 %
S.D. - BT	0.68145
S.D. - AT	0.5959
z value	- 4.600
P value	0.00
Inference	Significant

The initial mean score was reduced from 1.5667 to 0.562. The Rasayana treatment with Krushna tila showed 64.12 % [p - 0.00] improvement which was statistically significant.

Table 12 - showing results of patients according to Jarana Shakti

	Results of Jarana shakti
Mean BT	2.16
Mean AT	0.682
Mean difference	1.478
% of improvement	68.42 %
S.D. - BT	0.6815
S.D. - AT	0.5859
z value	- 4.625
P value	0.00
Inference	Significant

The initial mean score was reduced from 2.16 to 0.682. The Rasayana treatment with Krushna tila showed 68.42 % [p - 0.00] improvement which was statistically significant.

Table 13 - showing results of patients according to Nidra

	Results of Nidra
Mean BT	1.467
Mean AT	1.010
Mean difference	0.377
% of improvement	25.69 %
S.D. - BT	0.67466
S.D. - AT	0.59864
z value	- 1.03
P value	0.302
Inference	Insignificant

The initial mean score was reduced from 1.467 to 1.010. The Rasayana treatment with Krushna tila showed 25.69 % [p - 0.302] improvement which was statistically insignificant.

Table 14 - showing results of patients according to Twak parushata  
(dryness of skin)

	Results of Twak parushata (dryness of skin)
Mean BT	0.4333
Mean AT	0.1667
Mean difference	0.2666
% of improvement	61.52 %
S.D. - BT	0.56832
S.D. - AT	0.37905
z value	- 2.828
P value	0.005
Inference	Significant

The initial mean score was reduced from 0.4333 to 0.1667. The Rasayana treatment with Krushna tila showed 61.52 % [p - 0.05] improvement which was statistically significant.

Table 15 - showing results of patients according to Slatha asthi (bone weakness)

	Results of Slatha asthi (bone weakness)
Mean BT	0.8667
Mean AT	0.3333
Mean difference	0.5334
% of improvement	61.54 %
S.D. - BT	0.62881
S.D. - AT	0.47946
z value	- 3.771
P value	0.00
Inference	Significant

The initial mean score was reduced from 0.8667 to 0.3333. The Rasayana treatment with Krushna tila showed 61.54 % [p - 0.00] improvement which was statistically significant.

Table 16 - showing results of patients according to Slatha sandhi  
(flaccid joints)

	Results of Slatha sandhi (flaccid joints)
Mean BT	1.4667
Mean AT	0.7000
Mean difference	0.7667
% of improvement	52.27 %
S.D. - BT	0.68145
S.D. - AT	0.59596
z value	- 4.600
P value	0.01
Inference	Significant

The initial mean score was reduced from 1.4667 to 0.7000. The Rasayana treatment with Krushna tila showed 52.27 % [p - 0.01] improvement which was statistically significant.



Table 17 showing results of patients according to Khalitya (hair fall)

	Results of Khalitya (hair fall)
Mean BT	2.40
Mean AT	0.70
Mean difference	1.70
% of improvement	70.83 %
S.D. - BT	0.67466
S.D. - AT	0.59596
z value	- 4.919
P value	P = 0.00
Inference	Significant

The initial mean score was reduced from 2.40 to 0.70. The Rasayana treatment with Krushna tila showed 70.83 % [p - 0.00] improvement which was statistically significant.

Table 18 - showing Weight distribution of patients

	Results of Weight
Mean BT	71.6
Mean AT	72.5
Mean difference	0.9
% of improvement	1.256 %
S.D. - BT	10.52
S.D. - AT	10.72
z value	0.245
P value	0.8065
Inference	Insignificant

The initial mean score changed from 71.6 to 72.5. The Rasayana treatment with Krushna tila showed 1.256 % [p - 0.8065] improvement which was statistically insignificant.

Table 19 - showing *Quetelet's Index* distribution of patients

	Results of <i>Quetelet's Index</i>
Mean BT	2.482
Mean AT	2.55
Mean difference	0.068
% of improvement	17 %
S.D. - BT	0.28
S.D. - AT	0.26
z value	0.327
P value	0.744
Inference	Insignificant

The initial mean score changed from 2.482 to 2.55. The Rasayana treatment with Krushna tila showed 17 % [p - 0.744] improvement which was statistically insignificant.

Table 20 - showing Muscle Index distribution of patients

	Results of Muscle Index
Mean BT	5.32
Mean AT	6.05
Mean difference	- 0.73
% of improvement	10.42 %
S.D. - BT	2.34
S.D. - AT	3.30
z value	-1.81
P value	0.0703
Inference	Insignificant

The initial mean score changed from 5.32 to 6.05. The Rasayana treatment with Krushna tila showed 10.42 % [p - 0.0703] improvement which was statistically insignificant.

Table 21 - showing Lorenz's Constitutional Index distribution of patients

	Results of Lorenz's Constitutional Index
Mean BT	13.40
Mean AT	14.13
Mean difference	0.73
S.D. - BT	5.63
S.D. - AT	6.82
z value	-1.543
P value	0.0614
Inference	Insignificant

The initial mean score changed from 13.40 to 14.13. The Rasayana treatment with Krushna tila showed mean difference of 0.73 [p - 0.0614] improvement which was statistically insignificant.

Overall Results Of The Drug:-**Table 22 - showing statistical details of the variables**

<b>Variables</b>	<b>Mean difference</b>	<b>% of improvement</b>	<b>Z value</b>	<b>P value</b>
Abhyavaharan shakti	1.0047	64.12 %	- 4.600	0.00
Jarana shakti	1.478	68.42 %	- 4.625	0.00
Nidra	0.377	25.69 %	- 1.03	NS
Twak parushata	0.2666	61.52 %	- 2.828	0.005
Slatha asthi	0.5334	61.54 %	- 3.771	0.00
Slatha sandhi	0.7667	52.27 %	- 4.600	0.01
Khalitya	1.70	70.83 %	- 4.919	0.00
Weight	0.9	1.256 %	0.245	NS
<i>Quetelet's Index</i>	0.068	17 %	0.327	NS
Muscle Index	- 0.73	10.42 %	-1.81	NS
Lorenz's Constitutional Index	0.73	---	-1.543	NS

# DISCUSSION

## DISCUSSION

Health and health related issues have been given high values with respect to protection of one self from diseased conditions. Health has an important contribution to economic progress of self as well as nation. Healthy populations live longer, are more productive.

Āyurveda medicine a system of health care with historical roots in the Indian subcontinent, a Sanskrit word - Āyurveda which means “the wisdom of life” or “the knowledge of longevity”. In accordance to this definition, Ayurvedic medicine views health as much more than the absence of disease. Āyurveda is defined in eight branches, which are collectively called as Aṣṭāṅga Āyurveda. Rasāyana Cikitsā (Rejuvenation therapy) is one such branch of Āyurveda, which deals with various aspects of preventive health care. One of the important methods of preservation of positive health has been described in Āyurveda i.e. Rasāyana.

Kruṣṇa Tila or black sesame seeds are considered to have excellent medicinal properties and are recommended in Āyurveda for treatment purpose and as a Rasāyana dravya i.e. rejuvenating drug in vagbhata Samhita's.

Hence to understand the role of Kruṣṇa Tila as Rasāyana in improving the health status an attempt was made in the present study, details of which are being discussed in this chapter.



**DISCUSSION ON GENERAL OBSERVATIONS-****Age –**

All the cases were reported in the outpatient department of BVMF's Ayurved Hospital, pune. Among 100 patients, 39 patients [ 39 %] were in the age group of 40-45 years, 29 [ 29 %] patients were in age group of 45-50 years, 23 patients [ 23 % ] in the age group of 50-55 years and in 55-60 there were 09 [ 09 %] patients,

The prevalence of signs of early ageing is more visible in 40 to 50 years of age. According to Charak Ācārya the age above sixty years may be taken as old age, but Suśruta Ācārya increases this limit to seventy years. Present study reveals ageing signs after forties which might be due to decreased physical activity, changing food habits, improper & faulty diets, sedentary lifestyle, etc. has all lead to low Dhatu bala, low Ojas, vitiation of all Doshas.

**Sex-**

In the present study Majority of the patients i.e. 59 [59 %] patients were male and 41 [41 %] patients were of female sex Out of 100 patients. Stress and strain at physical and mental aspects is seen more in males which may be contributing factor or less reporting of females to the hospital may be one of the reasons.

**Marital status –**

In this study out of 100 patients 98 [98 %] were married and 02 [02 %] were unmarried. It does not indicate that married are more surely to get the early signs of ageing. This may be due to the manifestation of the ageing signs after middle age. So the percentage of married patients who were reported is more than unmarried.

**Occupation-**

Depending on the occupational distribution 27 [27 %] patients were accustomed to the house work; 14 [14 %] were in the business; 07 [07 %] to the agriculture work; 31 [31 %] were of office work; 12 [12 %] were teachers; 09 [09 %] were in others category. This shows that the patients who are doing less physical activity like house work, business, office work were afflicted more due to the sedentary life style, increased mental activity and stress & strain.

**Diet Pattern:**

33 [33 %] patients were of the vegetarian group; 67 [67 %] patients of the mixed group. This shows tendency of people inclining more towards mixed diet due to changes in dietary habits and growing fast food culture, outdoor eating habits which may be contributing factors.

**Socio economical status –**

Socio-economic status wise distribution of patients showed that majority of patients i.e. 79 [79 %] belonged to middle class followed by 14 [14 %] belonged to lower class, 07 [07 %] belonged to upper middle class. This

finding reflects the pattern of patients coming to the hospital of this institute according to their socio-economic conditions and also the increasing substantial sedentary habits among them.

### **Prakriti –**

Out of 100 patients of this series 12 [12 %] were of Pitta -Vāta Prakriti; 25 [25 %] were of Vāta-Pitta Prakriti, 29 [29 %] were of Kapha-Pitta Prakriti; 17 [17 %] were of Pitta-Kapha Prakriti and Vāta-Kapha Prakriti each. Majority of cases were from the Dwandva Prakriti. Vāta and Pitta dominant Prakruti associated with Kapha Dosha were seen which resembles the involvement of Vāta dosha as the main Dosha involved in present condition. Later stages of age are supposed to be Vāta dominant as stated in Ayurvedic classics.

**DISCUSSION ON EFFECT OF THERAPY-****On Abhyavaharan shakti -**

The initial mean score was reduced from 1.5667 to 0.562. The Rasāyana treatment with Kruṣṇa Tila showed 64.12 % [p - 0.00] improvement which was statistically significant. Significant relief in signs of Abhyavaharan shakti may be due to the action of Kruṣṇa Tila at agni level i.e improving the agni by katu, tikta rasa and ushna virya, which justifies the mode of action of Rasāyana dravyas at the level of agni

**On Jarana shakti -**

The initial mean score was reduced from 2.16 to 0.682. The Rasāyana treatment with Kruṣṇa Tila showed 68.42 % [p - 0.00] improvement which was statistically significant. Properties of Kruṣṇa Tila i.e. tikta rasa and ushna virya helps in improving the digestive system and overall metabolic activities of the body.

**On Nidra -**

The initial mean score was reduced from 1.467 to 1.010. The Rasāyana treatment with Kruṣṇa Tila showed 25.69 % [p - 0.302] improvement which was statistically insignificant. There is no direct effect of Kruṣṇa Tila seen on the parameter of nidra i.e. sleep.

**On Twak parushata (dryness of skin)-**

The initial mean score was reduced from 0.4333 to 0.1667. The Rasāyana treatment with Kruṣṇa Tila showed 61.52 % [p - 0.05] improvement which was statistically significant.

Twak-prasadana being one of the important properties of Kruṣṇa Tila may have helped in reducing the signs of twak parushta. Ācārya Susruta highlights the effect of Tila where it's said to be having Twakprasadana (skin tonic) qualities, which is justified with above results.

The content of vitamin E contained in this black sesame is the highest in all foods of plant origin. Vitamin E is also associated with healthy skin.

**On Slatha asthi (bone weakness) & Slatha sandhi –**

The initial mean score was reduced from 0.8667 to 0.3333 in Slatha asthi. The Rasāyana treatment with Kruṣṇa Tila showed 61.54 % [p - 0.00] improvement in Slatha asthi which was statistically significant. The initial mean score was reduced from 1.4667 to 0.7000 in Slatha sandhi. The Rasāyana treatment with Kruṣṇa Tila showed 52.27 % [p - 0.01] improvement in Slatha sandhi which was statistically significant.

Kruṣṇa Tila helps in Nourishment of body at micro nutrient level and the snigdha and ushna properties helps in preventing the Dhatu Kshaya thereby pacifying Vāta Dosha (Slatha asthi, Slatha sandhi being Vāta dominant lakshanas) and overcoming the symptoms.

Kruṣṇa Tila (black sesame) is also rich in calcium and zinc, important minerals for maintaining strong bones and preventing osteoporosis.

Black sesame seeds are an extremely good source of calcium; studies have shown that one gram of seeds contains approximately 85 milligrams of calcium.

### **On Khalitya-**

The initial mean score was reduced from 2.40 to 0.70. The Rasāyana treatment with Kruṣṇa Tila showed 70.83 % [p - 0.00] improvement which was statistically significant.

Kruṣṇa Tila showed significant results in lashana of khalitya, which may be due to snigdha, sukshma guna of drug. The black sesame seeds are rich in B vitamins and iron, and deficiencies in these nutrients have been linked to premature graying of hair, hair fall etc.

The Chinese believe that the nutrients in black sesame seeds can help to correct a bodily deficiency (in *Ying* and *Xue* of the *Gan* and *Shen*) brought about by aging, worrying and the toils of life, which in turn bring about aging-related symptoms like hair fall, graying hair etc.

### **On Weight-**

The initial mean score changed from 71.6 to 72.5. The Rasāyana treatment with Kruṣṇa Tila showed 1.256 % [p - 0.8065] improvement which was statistically insignificant.

**On Quetelet's Index, Muscle Index, Lorenz's Constitutional Index -**

The initial mean score changed from 2.482 to 2.55 in *Quetelet's Index*. The Rasāyana treatment with Kruṣṇa Tila showed 17 % [p - 0.744] improvement which was statistically insignificant. Quetelet's index (QI) represents a measure of nutrition status based on the height and weight of the person. In present study the insignificant results reveal that Kruṣṇa Tila had no effect on macro- nutrition of the body.

The initial mean score changed from 5.32 to 6.05 in Muscle Index. The Rasāyana treatment with Kruṣṇa Tila showed 10.42 % [p - 0.0703] improvement which was statistically insignificant. Muscle index (MI) is an orientation method about someone's muscle development. The insignificant results show that Kruṣṇa Tila had no direct effect in development of musculature of the body.

The initial mean score changed from 13.40 to 14.13 in Lorenz's Constitutional Index. The Rasāyana treatment with Kruṣṇa Tila showed mean difference of 0.73 [p - 0.0614] improvement which was statistically insignificant. Lorenz's constitutional index (LKI) gives information about body's components. If a calculated value is a positive, than an increase in a body mass goes on the account of muscles and bones. On contrary, if it's a negative then the adipose tissue is responsible for an increased body mass. Insignificant results suggest no direct action of Kruṣṇa Tila on nourishment of body at muscle and tissue level.

The above three readings of *Quetelet's Index*, Muscle Index, and Lorenz's Constitutional Index suggest that the nourishment property of Kruṣṇa Tila may be at micro level, as it is rich in micro nutrients like vitamin E, vitamin B, iron, zinc, magnesium etc. as there was no significant relief observed in body mass or muscle mass based on these parameters.

**Mechanism of Action (probable)**

“Taking black sesame seeds can heal all the chronic illness after 100 days, improve skin tone on body and face after 1 year, reverse gray hair after 2 years, and regrow teeth after 3 years.” explained in the *Materia Medica*, largest and most comprehensive manuscript in the history of Traditional Chinese medicine (TCM).

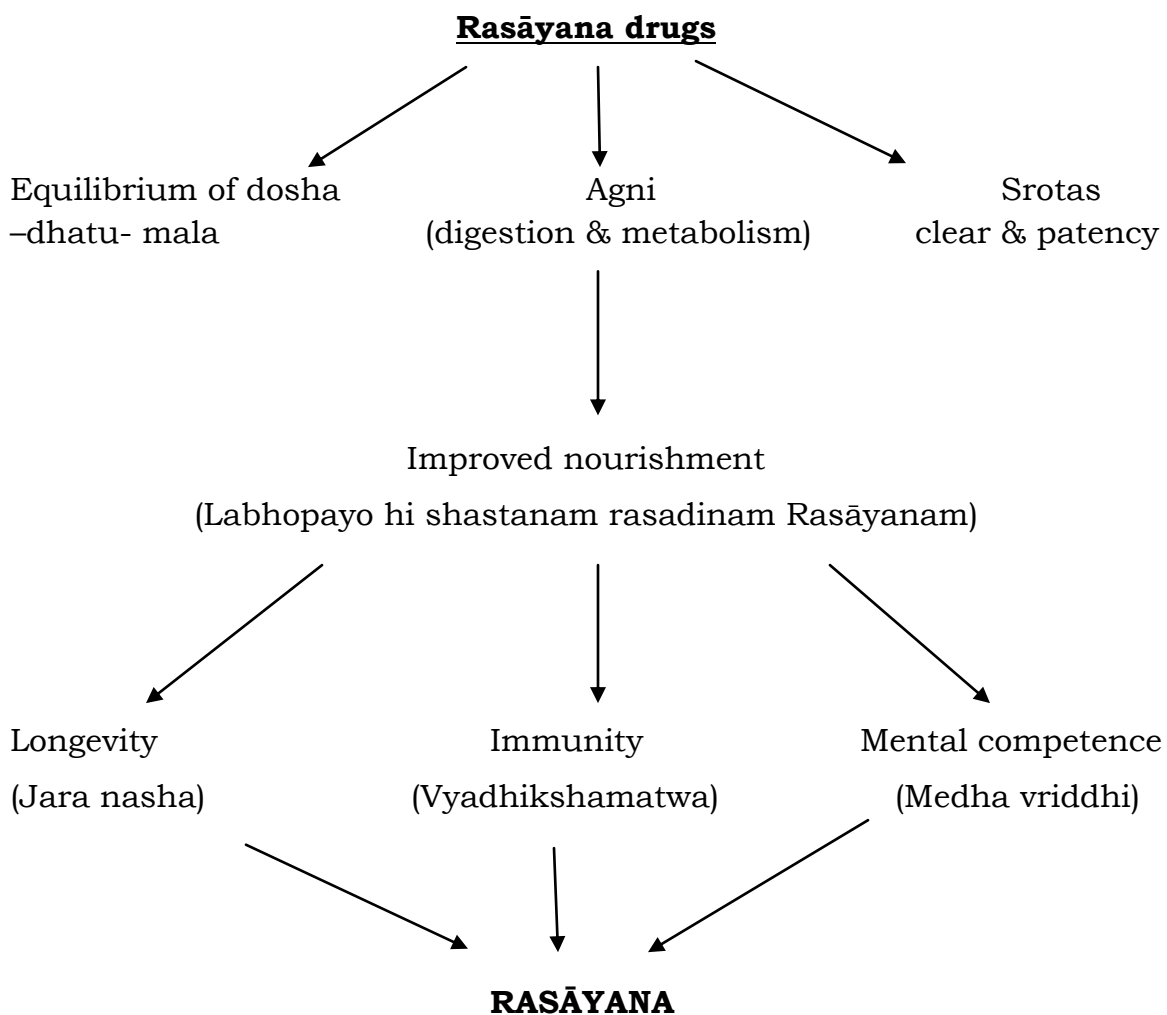
Sesame is probably the oldest reported oil plant to the mankind. Open Sesame! The magic phrase from the age-old tales of ‘Ali Baba and the Forty Thieves’ opened the cave hiding the treasure of the forty thieves. The phrase highlights the fact that sesame was a valuable commodity in those days.

- Rasāyana is a specialized therapy or branch of Āyurveda which influences the fundamental aspect of human body i.e. Dhatu, Agni and Srotas. It is assumed that different Rasāyana drugs may act with predominance effect at different levels.
- Rasāyana promotes nutrition by direct enrichment of the nutritional quality of rasa, by promoting nutrition through improving Agni thereby enhancing functions of Srotas i.e microcirculatory channels in body.
- It has been reported that the 'Rasāyanas' are rejuvenators, nutritional supplements and possess strong antioxidant activity.



- The black sesame seeds are rich in B vitamins and iron, and deficiencies in these nutrients have been linked to hair fall, premature graying of hair, memory impairments and hearing loss.
- It is also rich in calcium and zinc, important minerals for maintaining strong bones and preventing osteoporosis.
- The seed also contains substances known as sesamin and sesamol, which are found to increase vitamin E supplies (important for skin health) and lower cholesterol levels.
- The Madhura, Snigdha and guru guna of Kruṣṇa Tila help in nourishment of the dosha.
- Ushna virya and snigdha guna of Kruṣṇa Tila helps in pacifying vitiated Vāta dosha which is predominant factor in causation of symptoms of ageing.
- Katu, Tikta Rasa and Ushna Virya of Kruṣṇa Tila may have helped in improving the Agni, improving the metabolic activities of the body, thereby enhancing the nourishment of the body.
- Kruṣṇa Tila has properties of “Yogavahi” & sukshma which helps in cleansing srotas, thereby improving functions of srotas, which in turn helps in nourishment and formation of good quality tissues.

**Mode of action of Rasāyana dravyas- chart no. - 08**



Thus it can be stated from the present study that the Rasāyana effect of Kruṣṇa Tila can be seen at the agni level i.e. katu, tikta rasa and ushna virya helps in improvement of agni (digestion & metabolism), sukshma and yogvahi gunas of Kruṣṇa Tila helps supply of various micro nutrients like zinc, calcium, magnesium, vitamin E, lignans (antioxidants) etc. to each and every cell of the body, justifying the mode of action of Rasāyana dravyas.

# SUMMARY

## SUMMARY

The frame of the dissertation work entitled “Evaluation of the Rasāyana effect of Kruṣṇa Tila (*semen sesami nigrum*) – A Clinical Study” is designed in five sections viz.

- Literary review
- Drug review
- Methodology – Observations & Results
- Discussion
- Summary & Conclusion

The present study was undertaken with following aim and objectives:

Aim:

1. Study the Rasāyana effect of Kruṣṇa Tila in improving the health status.

Objectives:

1. Study in detail about Kruṣṇa tila.
2. Study the commonly occurring minor complaints of health and early ageing.
3. Understanding the concept of Rasāyana therapy and its practical utility to maintain and improve health status.

The literary review consists of overall view of the concept of Rasāyana and its therapeutics utilities from the Ayurvedic point of view as well as the understanding of Rasāyana from modern point of view. Historical review brings us the information about the Rasāyana since Vedic period and from different branches of medicine existing in past. The Rasāyana review comprises an elaborate coverage of the concept with description about etymology, definition, classification of Rasāyana and

understanding of Rasāyana for Swastha i.e. healthy individuals. The Rasāyana review from modern science deals with the understanding in detail of Rasāyana and its mechanism of action on various systems of the body at different levels. The literary review also elaborates concept of ageing and methods to overcome the same.

The second section comprises of drug review with detailed description of drugs under trial. Description about the Dravya used in trial, family, Latin names, Rasa, Virya, Vipaka, Karma of the Dravya as per Ayurvedic classics is mentioned. A detail regarding the constitution of the drug in terms of its chemical composition has been elaborated. Analyzing the Ayurvedic Classics and references regarding the drug from other contemporary sciences has been discussed, explaining composition of the drug and its uses in different condition.

The third section deals with the clinical study comprising the method of study, study design, drug intervention details, and selection of patients, assessment criteria, observations and results obtained from the study.

A clinical study with pre-test and post-test design where in 100 patients fulfilling the inclusion criteria of either sex between the age group of 40 to 60 years were selected for the study.

Patients were administered Kruṣṇa tila 10gm daily morning on empty stomach along with water to be chewed by the patients for a total period of 90 days

Patients were followed once in 15 days for a period of 03 months. After completion of the treatment, effect of therapy on each and every sign and symptoms was recorded and analyzed statistically.

Results obtained after completion of therapy are presented after statistical analysis.

Present study shows Kruṣṇa tila had significant relief in symptoms of Abhyavaharan shakti, Jāraṇa shakti, Twak parushata, Slatha asthi, Slatha sandh & Khalitya. Lakshana of Nidrā did not show any significant changes.

The readings of *Quetelet's Index*, Muscle Index, and Lorenz's Constitutional Index suggest that the nourishment property of Kruṣṇa tila may be at micro level, as it is rich in micro nutrients like vitamin E, vitamin B, iron, zinc, magnesium etc. as there was no significant relief observed in body mass or muscle mass based on these parameters. Interpretation of results is done in the fourth chapter of discussion.

Statistical analysis of total effect of therapies reveals that administration of Kruṣṇa tila showed Rasāyana effect of the drug by improving the Agni thereby restoring normal function of Srotas and providing micro-nutrition to the body.

# CONCLUSION



## CONCLUSION

The present study “*Evaluation of The Rasāyana Effect of Kruṣṇa Tila (Semen Sesami Nigrum) - A Clinical Study*” was undertaken with 100 patients. Patients were administered the research drug i.e. Kruṣṇa tila (*Semen Sesami Nigrum*). Following conclusions are drawn from the clinical study.

1. Early ageing & old age problems are at rise, for which Ayurveda exclusively has answer to maintaining & promotion of positive health through Rasāyana.
2. In the present study majority of patients i.e. 68 patients were between age group of 40-50 years and 54 patients were having vāta dominant prakruti or vāta associated prakruti. These observations highlights the occurrence of early ageing signs in the population and vāta being important doṣa involved, as truly stated in samhita’s about vāta predominance in later ages of life.
3. In Vāgbhata saṁhitā’s i.e. Aṣṭāṅga Saṁgraha & Aṣṭāṅga Hṛdaya use of Kruṣṇa tila as Rasāyana has been indicated. Kruṣṇa tila i.e. black sesame is preferable used for medicinal purpose.
4. Black sesame seeds are rich in calcium, iron, copper, magnesium, phosphorus. These minerals help to support healthy bones, muscles, blood, and nervous system. Copper strengthens blood vessels, joints, and bones, and is helpful in relieving arthritis. Magnesium supports vascular and respiratory health.

5. In the present study observations revealed significant relief in symptoms of Abhyavaharan Shakti (64.12 %), Jāraṇa shakti (68.42 %), twak parushta (61.52 %), khalitya (70.83 %).
6. Similarly there was significant relief recorded in symptoms of Slatha asthi (61.54 %), Slatha sandhi (52.27 %).
7. In relation to the observations of *quetelet's index*, *muscle index* and *lorenz's constitutional index*, the results did not show any significant changes in them.
8. The observations in the parameter of Nidrā after completion of research did not reveal any significant results.
9. It is assumed that different Rasāyana drugs may act with predominance effect at different levels like Agni, Dhatu and Srotas.
10. The Rasāyana effect of Kruṣṇa tila can be seen at the agni level i.e. katu, tikta rasa and ushna virya helps in improvement of agni (digestion & metabolism), sukshma and yogvahi gunas of Kruṣṇa tila helps supply of various micro nutrients like zinc, calcium, magnesium, vitamin E, lignans (antioxidants) etc. to each and every cell of the body, justifying the mode of action of Rasāyana dravyas.
11. Present study shows Kruṣṇa tila had significant relief in symptoms of Abhyavaharan shakti, Jarana shakti, Twak parushata, Slatha asthi, Slatha sandhi which may be due to the Madhura, snigdha, guru guna and yogvahi properties of drug.
12. Similarly Snigdha guna and ushna virya helps in pacifying vāta doṣa which is predominant in matured age groups.

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# **ANNEXURE**

**ANNEXURE****CASE PROFORMA**

BHARATI VIDYAPEETH UNIVERSITY COLLEGE OF AYURVED PUNE.  
DEPT. OF P.G. STUDIES IN SWASTHVRITTA

**“Evaluation of the Rasāyana effect of Kruṣṇa Tila (*semen sesami nigrum*) – A Clinical Study”**

PhD scholar:- Dr Arora Manish

Guide: - Dr. R. P. Patwardhan

**Rugna Patrakam (Case Paper)**

Rugna Nama :  
(Name of the Patient)

Rugna Patraka Kr. :  
(Case Paper No.)

Vayah :  
(Age)

Linga :  
(Gender)

Jati :  
(Religion / Caste)

Nivasa Sthana :  
(Address)

Vyavasaya :  
(Occupation)

Vedana Vishesha :  
(Chief complaint with duration)

Varthamana Vyadhi Vruttha:  
(History of present illness)

Purva Uthpanna Vyadhi Vruttha:

(History of previous illness)

Kula Vruttha :  
(Family History)

Ashtavidha Pareekshanani (Yogaratanakar)  
(Eight methods of examination)

Nadi  
(Pulse)

Shabda  
(Sound)

Mutra  
(Urine)

Sparsa  
(Touch)

Mala  
(Excretory Products)

Drik  
(Sight)

Jihwa  
(Tongue)

Akruti  
(Appearance)

Prakruti Pareekshanam  
(Determination of Body Constitution)

Pramanata Pareekshanam (Quantitative Examination) :

Aharata (Diet) :

Viharata (Activities) :

Vyasanam (Addictions) :

Asatmyam (Incompatible /Hypersensitivity):

Urah Pareekshan  
(Examination of Thorax)

Udara Pareekshan  
(Examination of Abdomen)

Vikruta Srotasam Nirvesha Thatha Pareekshanam  
(Examination of vitiated Srotas)

Srotas

Lakshana

Pareekshan

Hetu:  
(Causative Factor)

Dosha

Dushya

Vyadhimarga  
(Disease Pathway)

Upashaya - Anupashaya

Sambhava Vyadhi  
(Probable Diagnosis)

Vyadhi Vinischaya  
(Diagnosis)

Vyadhi Avastha  
(Disease Stage)

Sadhyasadhyatva  
(Prognosis)

Prayogshaleeya Pareekshan Thatha Anya Pareekshan  
(Pathological Investigations if any)

**Follow up:-**

<b>Assesment Criteria</b>	1 <sup>ST</sup> Follow up	2 <sup>nd</sup> Follow up	3 <sup>rd</sup> Follow up	4 <sup>th</sup> Follow up
Height				
Weight				
Quetelet's Index / BMI				
Muscle Index				
Lorenz's Constitutional Index				
Abhyavaharan shakti				
Jarana shati				
Nidra				
Twak parushata				
Slatha asthi				
Slatha sandhi				
Khalitya				

**Signature of scholar**

**Signature of Guide**