

**Review Article****SHATKRIYAKALA WITH SPECIAL REFERENCE TO HOMEOSTASIS AND PATHOGENESIS - A BRIEF REVIEW****Lalitkumar V. Vithalani^{1*}, Bhagyashri V. Sakharkar², Sanjay A. Dalvi³**¹Associate Professor & HOD, Dept. of Kriya Sharir, B.S. Ayurved College, Sawantwadi, Maharashtra.²Assistant Professor, Dept. of Shalyatantra, Govt. Ayurved College, Nagpur, Maharashtra.³Associate Professor & HOD, Dept. of Rachana Sharir, B.S. Ayurved College, Sawantwadi, Maharashtra.**KEYWORDS:** *Sanchaya, Prakopa, Prasara, Sthana samshraya, Vyaktavastha, Bhedavastha.***ABSTRACT**

Expression of any disease is a chain of various processes starting from the encounter of etiological factors unto formation of that disease. In Ayurveda it is stated that *Sharir Doshas* i.e., *Vata, Pitta* and *Kapha* are accountable for all kind of functions in the body. At the same time if there is imbalance in these *Doshas* due to any reason, they can affect *Dhatus* (body tissues) and can cause various diseases. The causation of disease is attributed to *Doshas* hence it is essential to know the movement of these *Doshas* in our body at any given point of time.

The word *Kriyakala* comprised of two words *Kriya* and *Kala* in which *Kriya* means treatment or action and *Kala* means time. Hence *Kriyakala* means the time of treatment or opportunities in the process of disease manifestation. *Shat Kriyakala* i.e. six stages are mentioned by *Aacharya Sushruta* which gives an idea regarding the present condition of *Doshadushti* and also the progress of disease in the body. It also guides us when to start treatment and what should be the line of treatment. In modern medicine it is described that one has to maintain homeostasis so as to remain in healthy. Human homeostasis refers to the body's ability to physiologically regulate its inner environment to ensure its stability in response to fluctuations in the outside environment and weather. When body fails to maintain homeostasis it leads to pathogenesis and formation of disease. The pathogenesis of a disease is the biological mechanism (or mechanisms) that lead to the diseased state. The term can also describe the origin and development of the disease and whether it is acute, chronic, or recurrent. This article highlights correlation of the summery based on the Ayurvedic theory of *Shatkriyakala* with special reference to modern theory of homeostasis and pathogenesis.

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In Ayurveda executing therapeutic measures to treat a disease has given second place whereas prevention of the disease and maintaining health has given the first priority. While defining complete health *Aacharya Sushruta* proposes the unique concept of balance between *Tridosha, Sapta Dhatu* and *Trimala* along with the equilibrium in the function of *Agni*(power of conversion) and overall bliss of *Aatma* (soul), *Indriya* (sense organs) and *Manha* mind.¹

According to this definition one who takes care of the above entities can lead a healthy, prosperous and long life. In Ayurveda it is stated that *Sharir Doshas* i.e., *Vata, Pitta* and *Kapha* are three pillars of life which are accountable for all kind of functions in the body. At the same time due to any reason if there is imbalance in these *Doshas* it can affect body tissues (*Dhatus*) and can cause various diseases. *Doshas* are the factors which are not only capable of vitiation but also having the

nature of vitiating *Dhatus* leading to *Dosha Dushya Sammurchhana* i.e., formation of disease.²

Shatkriyakala i.e. six stages are mentioned by *Acharya Sushruta* which gives an idea regarding the present condition of *Doshadushti* and also the progress of any disease in the body right from its beginning. It is one of the most important Ayurvedic principles explaining not only the stages of disease manifestation but also treatment approach in detail. These *Shatkriyakala* (six stages) are as follows.

01. *Sanchaya* (Stage of accumulation) - Gradual accumulation of *Doshas* in their respective seats.
02. *Prakopa* (Stage of inclination) - Accumulated *Doshas* moving upward in their location.
03. *Prasara* (Stage of immigration) - Aggravated *Doshas* leave their original place and spread to the other parts of the body through different *Strotasas*.
04. *Sthana Samshraya* (Stage of localisation) - Vitiating *Doshas* move to different places and get localised somewhere because of *Kha Vaigunya* i.e., obstruction in their path.
05. *Vyakti* (Stage of expression) - Appearance of symptoms of any specific disease is called as *Vyakti*.
06. *Bheda* (Stage of complication) - This is the stage of manifestation of specific signs and symptoms of that particular disease.

The word *Kriyakala* comprised of two words *Kriya* and *Kala* in which *Kriya* means treatment or action and *Kala* means time. So, *Kriyakala* means the time of treatment or opportunities in the process of disease manifestation.

Thus in case of any disease, we can apprehend that *Shatkriyakala* is the process of understanding the pathogenesis of any disease which begins from disturbance in homeostasis.³

AIM AND OBJECTIVES

This review article is intended to explain in detail about the concept of *Kriyakala*. We have also represented *Kriyakala* along with its correlation to homeostasis and pathogenesis in context to modern medical sciences. Our article is based on following objectives.

1. To depict the concept of *Shatkriyakala* and its importance in detail by review of literature.
2. To get knowledge about homeostasis and pathogenesis in context to modern medical sciences.
3. To understand correlation of *Shatkriyakala* in context to the modern concepts of homeostasis and pathogenesis.

Materials and Methods

This study is carried out mainly by literature research. Various *Ayurvedic* texts such as *Charaka Samhita*, *Sushruta Samhita*, *Ashtang Hridayam* etc. as well as modern references regarding homeostasis and pathogenesis were studied. Further an effort has been attempted to understand relationship between *Shatkriyakala* with that of homeostasis and pathogenesis. Also the importance of early and proper intervention with special reference to preventive aspects and prognosis of any disease is depicted with the help of *Kriyakala*.

Literature Review

As stated above *Shatkriyakala* described by *Acharya Sushruta* not only permits the systematic recognition of progress of any particular disease but also guides for prevention of the same long before it progresses into evidently distinguished disease.

Kriyakala is also known as *Chikistavasara Kala* (Proper time for treatment). If the vitiation of *Doshas* is in initial stage then by adopting simple treatment measures and changes in diet as well as environment adopting environmental changes, one can stop the *Dosha* from moving to the next stage *Shatkriyakala*.

1. Sanchaya

Sanchaya is the first stage of *Kriyakala*. Literally *Sanchaya* means collection. In context to *Shatkriyakala*, *Sanchaya* means accumulation of *Doshas* in their respective seat. In this stage, *Doshas* get accumulated in their seat but does not leave their own place. This state of *Doshas* is known as *Sanchaya*⁴. It is also known as *Samhata Rupa Vriddhi* (without mobility). Due to insufficient *Nidana* (causative factor) they increase but remain in solid state (i.e., immobile) in their own place. When *Doshas* further increase upto *Vilayana Rupa* (i.e., liquid state) they will start moving from their places to other places. So as to attain this stage, *Doshas* must require the strong *Nidanakara* (causative) factors.⁵

The aetiology of *Sanchaya* can be classified into

- i) *Kala Swabhava* (i.e., Natural) - It includes the seasonal and diurnal variations.
- ii) *Trividha Hetu* (three types of causative factors) - *Pragnya Paradha*, *Asatmendriyarthasanyoga*. (Unsuitable practices of sense organs), *Vyapannahetu* (Integral causes), and change in *Ahara* and *Vihara* (diet and regimen) is taken as *Trividha Hetus*. In *Sanchay Avastha* common symptoms develop such as dislike to similar *Guna* and *Rasa* of vitiating *Dosha*⁶ e.g., due to excessive intake of

sweets when *Kapha Dosh* is vitiated the person will develop dislike or sweets. In *Chaya Avastha* desire for opposite *Gunas* of vitiated *Doshas* may also develop. Specific symptoms and signs also develop viz. in *Vata Sanchaya Stabdhapurnakoshtha* in *Pitta Sanchaya*, *Mandoshmata*, *Pitavabhasata* etc.

2. Prakopa

After *Sanchaya Avastha* if causative factor persists then *Sanchayit Doshas* lands in *Prakopavastha*. *Acharya Vagbhata* defines *Prakopa* as *Unmargagamita* i.e., *Doshas* has just started upward movements in their respective places⁷. *Acharya Dalhana's* definition of *Prakopa* is extended state of *Chaya* in which *Doshas* are in a state which has developed the ability to move from their respective sites⁸. There are two types of *Prakopa*. *Chayapurvaka* is a state of *Prakopa* after *Sanchaya* state. In this case *Sanchaya* is a must state. For *Chayapurvaka Prakopa* some *Acharyas* used another term i.e., *Kathinyabala* (solidified growth). *Achayapurvaka Prakopa* means getting overspill without prior *Sanchaya*.⁹

The following symptomatology manifests in *Prakopa* stage.

Vata Prakopa Lakshana: *Koshtha Toda Sancharana* (Pain and movement of *Vata* in *Mahastrotasa*).

Pitta Prakopa Lakshana: *Amlika* (Sour eructation), *Paridaha* (burning sensation all over the body), *Pipasa* (excessive thirst).

Kapha Prakopa Lakshana: *Annadwesa* (Dislike of food), *Hrudayotkleda* (excessive salivation).¹⁰

3. Prasara

It is the third stage of *Kriyakala*. If *Dosha Dushtikara Nidana* continues even after *Prakopavastha* then these *Doshas* will move to the stage of *Prasara*¹¹. In *Prasaravastha* *Doshas* will overflow or move from own place to other places all over the body. *Samprapti* (pathogenesis) of *Prasara* has been defined in most of the *Samhitas* because of its importance in manifestation of the disease.¹²

The following example gives an illustration about *Sanchaya*, *Prakopa* and *Prasaravastha*.

Sanchayavastha - *Samhatarupa Vriddhi* - Ghee in solid state;

Sanchayavastha- *Vilayanarupa Vriddhi*- Heated liquefied ghee in a bowl;

Prakopavastha -effervesce i.e., bubbles appearing in boiling *Ghee*;

Prasaravastha - *Ghee* spreading out of the bowl (Overflowing *Ghee*)¹³.

All *Dhatu*, *Malas*, *Pitta* and *Kapha Dosh* are *Pangu* (inactive) i.e., they may increase in quantities

but does not have the capacity to move from one place to another. For movement they need to get stimulated and transported to different places by *Vata Dosh* only¹⁴. Hence it is clear that *Vata* is a key factor for manifestation of *Prasaravastha* in the process of expression of a disease. Firstly *Linga Chikitsa* (symptomatic treatment) is recommended in *Prasara Avastha* and then *Vyadhi Pratyanka Chikitsa* (Disease specific treatment) should be advocated¹⁵.

4. Sthanasamshraya

We have already discussed that in *Prasaravastha*, *Doshas* moves from their place to all over the body. If *Doshas* are not treated in this very stage, further these vitiated *Doshas* will settle down in *Dhatu* where ever *Strotovaigunya* (depletion of tissue) is presents. That settlement of *Doshas* at any particular place is called as *SthanaSamshraya*.¹⁶

For *Doshas* to get fixed at a particular site they require certain preconditions like *Nidana* must be powerful enough to cause damage; there must be some place i.e. *Kha Vaigunya* (tissue weakening).

Hence it is clear that *Nidana* itself (responsible factors) by triggering the *Dosha* may cause *Stroto Vaigunya* (tissue depletion) there by foundation of a disease. At the time of *Dosha-prakopa* if *Khavaigunya* (atrophy or dystrophy) already exists at tissue level, *Doshas* may cause disease at that site. In both these conditions the blending of *Doshas* and *Dushya* at any particular site is termed as *Sthanasamshraya*. In this stage *Purvarupa* (prodromal signs and symptoms) develops at a particular *Strotas* which indicates location and cause of disease.

In this stage of *Kriyakala* the complete representation of a disease will not appear evidently because this is the budding stage of that disease. Regarding *Sthanasanshraya*, *Acharya Madhavkara* has stated that this stage of *Kriyakala* is easy to recognise due to presence of *Purvarupas* (Prodromal symptoms) of a particular disease. Hence this is the most important stage regarding treatment of any disease.¹⁷

5. Vyakti

This is the fifth stage of *Kriyakala*. In *Sthanasanshraya Avastha*, if patient continues to indulge in *Nidana* then *Doshas* will enter into *Vyakti* (disease manifestation) stage. In this stage there is *Vyadhi Darshana* means presence of all the signs and symptoms of a particular disease. In this stage *Doshic* predominance, involvement of *Dushya* and *Strotas* will also be clearly revealed. This stage helps the physician to diagnose and plan the specific line of treatment for that particular disease.

Basic sign and symptoms of diseases are expressed in this stage. Some of the examples are increased body temperature is observed in case of *Jwara*. Excessive watery stool is seen in *Atisara* and an unusual enlargement of abdomen is observed in *Udara Roga*. *Vyadhi Pratyanka Chikitsa* i.e., treatment quoted in the management of particular disease must be adopted.¹⁸

6. Bheda

In this *Avastha* proper diagnosis of disease (*Vyadhibheda*) can be done according to specific predominance of *Doshas*. Certain sign and symptoms of that disease manifests in this stage. If the disease is untreated or encountered with insufficient *Vyadhivighatakara Bhavas* that disease lands in next stage of *Bhedavastha* in which it gives rise to another disease which is called *Upadrava* (complications).¹⁹

In *Ayurveda* executing therapeutic measures to treat a disease has given second place whereas prevention of the disease has given first priority. Various therapies described in *Ayurveda* especially *Panchakarma* and *Rutu Shodhana* are founded for restoration of functional balance (homeostasis). *Rasayana* concept of *Ayurveda* explains nourishment of *Dhatu*s (tissue regeneration).

Homeostasis

Homeostasis in a general sense refers to stability, balance or equilibrium. Maintaining a stable internal environment requires constant checking and adjustments in human body as conditions changes. Homeo means same and stasis means standing. Thus homeostasis means 'maintenance of internal environment of the body'. Claude Bernard first described the processes of physiologic control as the 'milieu interieur' in his book, 'An Introduction to the Study of Experimental Medicine'²⁰. The term homeostasis was later coined by Walter Bradford Cannon in his book 'Organization for Physiological Homeostasis'.²¹

Human homeostasis refers to the body's ability to physiologically regulate its inner environment to ensure its stability in response to fluctuations in the outside environment and weather. Liver, kidneys, and the brain (hypothalamus, the autonomic nervous system and the endocrine system) help to maintain homeostasis.²² For maintaining homeostasis normally all body organs and organ systems work in synergism. Liver is responsible for metabolizing most of the substances including toxic substances and maintaining carbohydrate metabolism. Kidneys are responsible for regulating blood water levels, reabsorption of substances into the blood,

maintenance of salt and ion levels in the blood, regulation of blood pH, and excretion of urea and other waste products.

Examples of homeostasis include the regulation of body temperature and the balance between acidity and alkalinity. It is a process that retains the stability of the organism's internal environment in reaction to variations in external environmental conditions.²³

Mechanism of maintenance of homeostasis

Homeostatic regulation involves three parts or mechanisms: 1) the receptor, 2) the control centre and 3) the effector. The receptor receives information that something in the environment is changing. The control centre or integration centre receives and processes information from the receptor. And lastly, the effector responds to the commands of the control centre by either opposing or enhancing the stimulus. This is an on-going process that continually works to restore and maintain homeostasis. For example, in regulating body temperature there are temperature receptors in the skin, which communicate information to the brain, which is the control centre, and the effector is our blood vessels and sweat glands.²⁴

Positive feedback mechanism

In positive feedback mechanisms, the response to a stimulus does not stop or reverse it but instead keeps the sequence of events going up. It causes a self-amplifying cycle where a physiological change leads to even greater change in the same direction.

The positive feedback is less common in nature than the negative one. A positive feedback mechanism can be harmful, as in case of fever that causes metabolic changes pushing it to be higher. However, in some instances, the body uses this mechanism for its advantage. A good example of significant positive feedback is the childbirth. Ovulation, coagulation, platelet aggregation, inflammation and shock are other instances in which the positive feedback plays a valuable role.²⁵

Negative feedback mechanism

A reaction in which the system responds in such a way that it reverses the direction of change. Since this tends to keep things constant, it allows the maintenance of homeostasis. For instance, when the concentration of carbon dioxide in the human body increases, the lungs are signalled to increase their activity and expel more carbon dioxide.²⁶

Thermoregulation is another most important example of a negative feedback mechanism. The hypothalamus, which monitors body temperature, is capable of determining even

the slightest variations in body temperature. Response to such variation could be stimulation of glands that produce sweat to reduce the temperature, or signalling various muscles to shiver to increase body temperature.

A good example of negative feedback mechanism is the regulation of blood pressure. Blood vessels can sense the resistance to blood flow when blood pressure increases. The blood vessels act as receptors, relaying the message to the brain. The brain then sends a message to the heart and blood vessels, both of which are effectors. The heart rate will decrease as the blood vessels increase in diameter (vasodilatation). This change causes the blood pressure to fall back into its normal range. The opposite happens when blood pressure decreases, causing vasoconstriction.²⁷

Homeostatic Imbalance

Every living organism depends on maintaining a complex set of interacting metabolic chemical reactions. From the simplest unicellular organisms, to the most complex plants and animals, internal processes operate to keep their conditions within tightly regulated and controlled limits or range to allow these reactions to proceed. Homeostatic processes act at the level of the cell, the tissue, and the organ, as well as at the level of the organism as a whole, referred to as allostasis.²⁸ Range is the acceptable window of values between the upper and lower limits of a variable. If that variable (e.g. body temperature) is maintained within range by homeostatic mechanism then the person is said to be healthy.²⁹

Inability to maintain homeostasis due to any reason may lead to a disease or even death. For instance, heart failure may occur when negative feedback mechanisms become overwhelmed and destructive positive feedback mechanisms take over. Most of the diseases involve conflicts in homeostasis. For example, as the organism ages, the efficiency in the control of systems becomes reduced due to the loss of receptors. The inefficiencies gradually result in an unstable internal environment that increases the risk of illness, leading to the physical changes associated with aging.³⁰ Certain homeostatic imbalances, such as a high core body temperature, a high concentration of salt in the blood, or a low concentration of oxygen, can generate homeostatic reactions such as warmth, thirst, or breathlessness, which motivate behaviour aimed at restoring homeostasis. Inability of body to maintain homeostasis leads to pathogenesis and if not treated at proper time can lead to a disease or even death.³¹

Pathogenesis

The word pathogenesis comes from the Greek word *Pathos* means disease and *genesis* means creation. Pathogenesis is the manner of development of a disease.³² The pathogenesis of a disease is the biological mechanism that lead to the diseased state. The term can also describe the origin and development of the disease, and whether it is acute, chronic, or recurrent.³³ It indicates the way in which a disease evolves over time from the initial stage of its pre-pathogenesis phase to its close as recovery, disability, or death, in the absence of action or prevention.³⁴

Importance of Doshagati in Treatment

If accumulated *Doshas* are eliminated periodically they won't progress to consecutive stages of *Kriyakala*. If not, they progress to successive stages and become deeply rooted. *Acharya Sushruta* advised that one should consume food only when the *Doshas* navigate in their own pathways, when *Vata* functions properly and when the *Agni* (digestive power) is in ignited state.³⁵

Classical Treatment Approach

Acharya Sushruta has described the principle of *Shatkriyakala* in 21st chapter of *Sutrasthana* of his treatise *Sushruta Samhita*. The *Doshas* get vitiated due to *Ahita Aahara-Vihara Sevana* (indulgence in unsuitable diet and lifestyle) and bring about abnormalities in *Dhatu*s and produce diseases³⁶. *Vaikrita Doshagati* i.e., *Kopa* includes both *Kshaya* and *Vridhdha Doshas*. *Ksheen Doshas* must be managed by *Brimhana* whereas *Vridhdha Doshas* must be managed by *Shamana* or *Shodhana Chikitsa*.

1. Dasha Kshaya- *Ksheena Doshas* should be managed by *Brimhana*. It can be normalized by supplementing *Aahara* and *Vihara* that are similar in quality of *Ksheen Doshas*.

2. Sthana Doshas- *Doshas* which are in normal stage; their normalcy must be conserved by proper *Aahara* and *Vihara*.

3. Dasha Vridhdhi- State of vitiation of any *Dosha* can be antagonized by providing *Aahara* and *Vihara* which are having opposite qualities.

Further the *Chaya* and *Prakopa* stages of *Kriyakala* should be managed with seasonal *Shodhana* and *Shamana Chikitsas* whereas the *Prasara* stage is managed primarily by *Hetulinga Chikitsa* (symptomatic treatment). In *Vyakti* and *Bheda Avasthas*, *Vyadhipratyanika Chikitsa* (disease specific treatment) must be employed. If any disease is treated in its earlier stage, there is effective reduction in the drug doses as well as the

total duration required for re-establishing equilibrium at *Dosha* and *Dhatu* level. Therefore one should not neglect *Kriyakala*.³⁷

CONCLUSION

Now it is high time to focus on the prevention of diseases in society with the application of gold standard Ayurvedic wisdom. In Ayurveda progression of any disease is explained in six stages of *Shatkriyakala*. *Dosha* are considered as the biological entities of the body on which health or illness of an individual depends. In present scenario food habits, food contents and life style of society has drastically changed and day by day still changing very rapidly. Unwholesome diet or improper life style causes disturbance in the normalcy of the *Doshas* first and then pathogenesis starts involving the *Dhatu*.

By proper history taking of any disease we can correlate disturbance in homeostasis with *Sanchaya*, *Prakopa* and *Prasara Avastha*. Further pathogenesis and advance stage of any disease can be correlated with *Sthansanshraya*, *Vyakti* and *Bhedavastha* of *Shatkriyakal*. By proper understanding of *Doshagati* and *Kriyakala* one can diagnose any disease in its early stage and it will be helpful for its further treatment.

Modern diagnostic tools have equipped the doctor to identify any disease and treat it in *Sthana Samshraya* stage only whereas *Ayurveda* emphasizes on maintaining homeostasis by taking proper measures in initial stages of *Shatkriyakala*.

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