

# *Dashavidha Parikshya Bhava* (tenfold of investigation) according to Acharya Charaka – An ancient method of research

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## Abstract

Research follows a scientific way of establishing facts. All those methods which are used by the researcher during the course of studying the research problem are termed as research methods. The scientific method implies an objective, logical, and systematic method. Research is an organized endeavor. Like any other organized work, research requires proper planning, that systematizes the research work. It eliminates aimless intellectual wandering. Database of knowledge creation and its classification gives a definite structure to any literature. However, it needs a proper research methodology, without which the structure is incomplete. Ayurveda experts have followed certain research methods and methodology. The traditionally established truths need to be validated in scientific manner. Validation of ancient methods of investigation or research will ultimately lead to establishment of Ayurveda as a science which will contribute to broad domain of Indian research methodology. The critical scientific approach of Ayurveda is evident from various ancient methods. Proper planning before performance of any task is always advised by authoritative persons. Acharya Charaka has given *Dashavidha Parikshya Bhava*, i.e. tenfold of investigation which are necessary for accomplishment of task without intellectual wandering. The desired objectives can be achieved if proper planning is done beforehand. This study is an attempt to establish the applicability of *Dashavidha Parikshya Bhava*, i.e. tenfold of investigation in planning of research mentioned in Charaka Samhita.

**Keywords:** *Dashavidha Parikshya Bhava*, research methodology, ten points of investigations

## Introduction

Research commonly refers to a search for knowledge. Search or inquiry for truth in an intelligent and scientific manner is called a research.<sup>[1]</sup> Research inculcates scientific and inductive thinking and it promotes the development of logical habits of thinking and organization. All those methods which are used by the researcher during the course of studying the research problem are termed as research methods. The steps in research can be broadly classified as planning, operation and reporting.

Research is an organized endeavor. Like any other organized work, research requires proper planning. Planning is considered as deciding in advance. It includes the question or issue to be studied, setting the objectives of the study, and determining the means of achieving those objectives. It is an intellectual process. It requires intellectual curiosity, intelligence, imagination, knowledge of the respective field as well as knowledge of research methodology. It gives direction to the work. The desired objectives can be achieved if proper planning is done beforehand.

Direction toward planning before actually beginning with the treatment of the patients has been mentioned in Charaka Samhita such as, a physician should first of all diagnose the disease and then he should proceed for treatment,<sup>[2]</sup> able physicians always proceed for treatment after proper examination<sup>[3]</sup> and the wise physician admire action initiated with due knowledge.<sup>[4]</sup> Hence, proper planning before performance of any task is always praised by *Apta*, i.e. authoritative persons.

Acharya Charaka has mentioned *Dashavidha Parikshya Bhava*, i.e., ten factors to be assessed which are necessary for accomplishment of task without intellectual wandering.<sup>[4]</sup> A physician can accomplish the desired object without any special effort, provided that he duly initiates action after having full knowledge of cause or reason (*Karana*), instrument (*Karana*),

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source of action (*Karyayoni*), action itself (*Karya*), fruits of action (*Karyaphala*), subsequent manifestation (*Anubandha*), habitat (*Desha*), season (*Kala*), initiation of action (*Pravritti*) and means of action (*Upaya*).<sup>[4]</sup>

## Materials and Methods

In this critical review, *Dashavidha Parikshya Bhava* (tenfold of investigation) have been compiled from Charaka Samhita; further, it was interpreted and compared with contemporary tools of research and major steps involved in research, especially planning of research.

### *Dashavidha Parikshya Bhava* – as an ancient method of research

In the eighth chapter of *Vimanasthana-Rogabhishagjitiyadhyaya*, Acharya Charaka has mentioned three different means of gaining knowledge (*Trividha Gyanopaya*) of science as learning (*Adhyayana*), teaching (*Adhyapana*) and discussions and debates (*Tadvidya-Sambhasha*).<sup>[5]</sup>

To defeat the opponent in *Vigrihya-Sambhasha* (hostile discussion), the physician should have a knowledge of various tactics, such as 44 *Vadamarga* (logical terms useful in discussion) and *Dashavidha Parikshya Bhava* (tenfold of investigation). According to the Indian philosophical schools of thought, the antecedent, which is unconditionally and invariably preceding a change or effect, is known as a reason or the cause.<sup>[6]</sup> Charaka Samhita has described effect (*Karya*) and the reason or the cause (*Karana*) in context to health and diseased state of the human body. By understanding and studying the concept of effect (*Karya*) and the reason or the cause (*Karana*), one can achieve the chief and final goal of Ayurvedic system of medicine. *Charakokta Dashavidha Parikshya Bhava* is an employment of *Karya-Karanavada*.

These *Dashavidha Parikshya Bhava* are as follows:

#### *Karana* (cause or reason)

*Karana* is the cause of an action. *Karana* is the definite and inevitable material which initiates the action and is mandatory for accomplishment of any task.<sup>[7]</sup> *Karana* is of three types: intimate cause (*Samavayi Karana*), nonintimate cause (*Asamavayi Karana*) and instrumental cause (*Nimitta Karana*).<sup>[8]</sup> Acharya Charaka has defined doer, performer of the task or subject (*Karta*) as a *Karana*.<sup>[7]</sup>

*Karta* (doer) is an agent who initiates action independently. *Karta* is considered to be the cause of an action. Chakrapani (commentator of Charaka Samhita), says *Karta*, is the motivator for other *Karana*, and *Kartritva* (doer ship, owning the responsibility for doing an action) is associated with *Karta*. Physician (*Bhishaka*) is given prime importance in treatment among four limbs of treatment.<sup>[9]</sup>

Research is an attitude complemented effectively by action. The attitudes conducive to research have two aspects: One is curiosity; the other is courage to question prevalent beliefs and customs. The action needed for research also has two aspects:

one is acquiring existing knowledge and training in physical and mental skills necessary to do the activities implied in research and the other is the determination to follow a plan with performance. One should have the above mentioned qualities to become a good researcher.

According to Charaka Samhita, a physician is considered to be endowed with qualities such as examiner (*Parikshaka*), a person knowing logical planning (*Yuktigya*), a person with insightful understanding (*Vigyata*), administrator (*Shashita*), endowed with prescribing knowledge (*Yokta*) and many more.<sup>[10]</sup> These are nothing but the qualities of a researcher such as inquisitiveness, motivation, interest, commitment and critical scientific approach. Qualities of a physician (*Vaidyaguna*) as given in Charaka Samhita can be compared with that of a researcher, as both of them are involved in the critical study of their respective subject matter.

#### *Karana* (instrument)

The instrument which helps an agent to perform an action is called as *Karana*. *Karana* is the instrument which constitutes the means par excellence to the accomplishment of an action.<sup>[11]</sup> Drugs (*Bheshaja*) are considered as *Karana* or instrument (*Sadhana*) of a physician (*Karta*) for the accomplishment of treatment.<sup>[12]</sup> For a researcher, instruments (*Karana*) can be considered as research methods employed by him during the course of studying his research problem. All those methods which are used by the researcher during the course of studying the research problem are termed as research methods.

Scientific research methods call for explanations based on collected facts, measurements and observations and not on reasoning alone.<sup>[13]</sup> The investigational product or procedures under trial can also be considered as *Karana*.

#### *Karyayoni* (source of an action)

One which becomes an action by the process of transformation is called as source of an action (*Karyayoni*).<sup>[14]</sup> It can also be said that *Karyayoni* is that which attains the status of action after transformation. Source of an action (*Karyayoni*) remains in inseparable relation with action or effect (*Karya*). A cause transforms itself into an effect. This is considered to be the origin of action. *Karyayoni* is a state of imbalance of *Dosha-Dhatu-Mala* (*Dhatu-Vaishamya*) or diseased condition of a patient which is the area of interest for a physician.<sup>[15]</sup> In research, source of an action (*Karyayoni*) can be considered as a research problem or research question.

In research process, the first and foremost step happens to be that of selecting and defining a research problem properly. A researcher must find the problem and formulate it so that it becomes susceptible to research. A research problem, in general, refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation and wants to obtain a solution for the same. It is one which requires a researcher to find the best solution for the given problem, i.e. to find by which course of action the

objective can be attained optimally in the context of a given environment. A proper definition of research problem will enable the researcher to be on the track whereas an ill-defined problem may create hurdles.<sup>[16]</sup> Formulation of hypothesis, one of the major steps in planning, can also be considered in *Karyayoni*. A research hypothesis is a predictive statement, capable of being tested by scientific methods, that relates an independent variable to some dependent variable. The formulation of a hypothesis provides a study with focus. It tells what specific aspects of a research problem to investigate, what data to be collected, and what not are to be collected, thereby providing focus are to be the study. As it provides a focus, the construction of a hypothesis enhances objectivity in a study.

### **Karya (action itself)**

*Karya* or the action is the one whose accomplishment is kept in view before an agent proceeds to act.<sup>[17]</sup> *Karya* (action) is a state of equilibrium of *Dosha-Dhatu-Mala* (*Dhatu-Samya*) which is the objective of a physician.<sup>[18]</sup> For a researcher, *Karya* (action) can be considered as aims and objectives or purpose of a research study.

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find the truth which is hidden and which has not been discovered yet. Although each research study has its own specific purpose, we may think of research objectives as falling into a number of the following broad groupings:

1. To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or formulative research studies)
2. To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as descriptive research studies)
3. To determine the frequency with which something occurs or with which it is associated (studies with this object in view are known as diagnostic research studies)
4. To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).<sup>[1]</sup>

Operational phase of research which consists of construction of tools of data collection, pretesting tools and their revision, collection of data, processing of data and analysis of data and interpretation of results can also be considered as a *Karya*.<sup>[19]</sup>

### **Karyaphala (outcomes)**

*Karyaphala* or the object of action stands for the object for which the action is initiated.<sup>[20]</sup> For a physician, outcome (*Karyaphala*) is an attainment of happiness, i.e., the state of freedom from disease.<sup>[21]</sup> For a researcher, outcome (*Karyaphala*) can be considered as endpoints or outcomes of the research study. The variable capable of providing the most clinically relevant and convincing evidence related to the primary objective of the trial is called as an endpoint of the study. There are two types of endpoints: direct and surrogate. Direct endpoint is directly related to the primary objective of the trial and crucial to specify its precise

definition and rationale for selection. A surrogate endpoint of a clinical trial is a laboratory measurement or a physiological sign used as a substitute for a clinically meaningful endpoint that measures directly how a patient feels, functions, or survives.<sup>[22]</sup> Both these endpoints can be compared with *Karyaphala* (outcome), which the researcher tries to achieve through various operations.

### **Anubandha (subsequent manifestation)**

An after effect good or bad is the one which is bound to leave its impact on the agent after he has performed his action.<sup>[23]</sup> Longevity is subsequent manifestation (*Anubandha*) in treatment.<sup>[24]</sup> Long-term effects of research study can be considered as subsequent manifestation (*Anubandha*) in case of research study. Teleological ethics can also be thought of in this context. Teleological ethics is a theory of morality that derives duty or moral obligation from what is good or desirable as an end to be achieved. Thalidomide tragedy is a realistic example of teleological ethics. Impacts of research on society can also be considered in subsequent manifestation.

### **Desha (habitat)**

*Desha* (location or habitat) represents the site favorable or unfavorable to an action.<sup>[25]</sup> Both the land and the patient constitute *Desha* (location) in case of a physician.<sup>[26]</sup> Selection of study site plays an important role in any research study. Geographical distribution is considered for selection of samples as well as interpretation of results. Ecological studies can be considered under *Desha* (location) factor, which are meant to explore the statistical connection between disease in different population groups and estimated exposures in groups rather than individuals. The geographic information system is a very useful new tool that improves the ability of ecological studies to be able to determine a link between health data and a source of environmental exposure.<sup>[27]</sup>

### **Kala (season)**

*Kala* (season) is nothing but a process of transformation into seasons, solstices, etc.<sup>[28]</sup> The year consisting of seasons and the state of the disease constitute the season (*Kala*).<sup>[29]</sup> Time period is also an important aspect for a research study. Analytical research studies such as cross-sectional, case-control and cohort can also be included under season. Inference of the cause from the effect relates to the past. This can be correlated with the case-control study design (i.e., retrospective study). Inference of the effect from the cause relates to the future. This can be correlated with cohort or prospective study design. The commonly observed events at present can be correlated with cross-sectional study design (time prevalence study). Time also relates to season in which study is to be conducted. Epidemiological studies (pertaining to time) also require time factor to be taken into consideration.

### **Pravritti (initiation of action)**

*Pravritti* (initiation of action) or endeavor represents the initiation of action as a means to the accomplishment of an objectives and this is an effort as well as beginning of



action.<sup>[30]</sup> *Pravritti* (initiation of action) is the effort taken for the accomplishment of objective. In the context of treatment, *Pravritti* or endeavor is the initiation of therapeutic action.<sup>[12]</sup> It represents the action of four limbs of treatment, physician, medicaments, patient and the attendant. For a researcher, motivation in research can be considered as a *Pravritti* (initiation of action).

The possible motives for doing research may be desire to get a research degree along with its consequential benefits or to face the challenge in solving the unsolved problems, i.e. concern over practical problems initiates research, to get intellectual joy of doing some activity, to be of service to society, or to get respectability.<sup>[1]</sup> Formal training in research methodology and thorough knowledge of the subject are not enough for the accomplishment of objective of study but in addition require motivation to do consistent efforts. Ethical and scientific aspects also play a significant role in accomplishment of task in proper way which can be considered under *Pravritti*.

### Upaya (means of action)

*Upaya* (means of action) stands for bringing about excellence in the agent, the instrument, and the origin of action and their proper setting.<sup>[31]</sup> Device has no meaning after an action has been performed. The stage of device comes much prior to the stage of the production of an action. It is not required even in the initiation of an action not after the accomplishment of an object or its after effects. It is required in the relation to an agent, an instrument and the origin of action prior to actual initiation of an action. The excellence of the physician and the correctness of the therapy constitute *Upaya* (means of action).<sup>[12]</sup> Excellence of researcher, suitable research methods, proper selection and definition of research problem, and formulation of hypothesis helpful for smooth operation of plan of work can be considered as *Upaya* (means of action). Here, *Karana* represents researcher with all of his qualities, *Karana* represents selection of proper research methods, whereas *Karyayoni* represents proper selection and definition of research problem.

## Discussion

As stated in *Charaka Samhita*, that it is not easy to acquire comprehensive knowledge of the Science of life. Therefore, one should make honest efforts to be in constant touch with this science. The wise consider the entire universe as their preceptor; it is only the unwise who consider it to be their enemy.<sup>[32]</sup>

Ayurveda is a traditional system of medicine which means that it has its roots in ancient times and has continued to serve the society till modern times. Being an ancient belief system, one may get impression that knowledge of science of Ayurveda is based on arbitrary method of search for truth. However, this is not at all true. In contrary, Ayurveda is the science of medicine which adopts critical scientific approach or scientific method to acquire knowledge. To gain clear knowledge of Ayurveda and to apply it in practice, it

was necessary to search for scientific devices or methods of approach. This necessity has prompted the authors of ancient texts of Ayurveda to adopt scientific methods. For researches in Ayurveda, a studious inquiry with objectivism and purpose is desired with appropriate methods suitable to the principles and practices of Ayurveda.

The critical scientific approach of Ayurveda is evident from various ancient methods such as *Pramana-Vigyana* (epistemology), *Vadamarga* (logical terms useful in discussion), *Dashavidha Parikshya Bhava* (tenfold of investigation), *Tantrayukti* (principles of documentation), *Vaidyavritti/Vaidyaguna* (qualities of a physician) and various *Nyaya* (maxims).

Classical literature of Ayurveda has encapsulated wisdom of protocols for documentations and research in Ayurveda. One of them is “*Dashavidha Parikshya Bhava*” given in *Charaka Samhita*.

*Charakokta Dashavidha Parikshya Bhava* can be correlated with one of the major steps involved in research, i.e. planning. Proper planning before performance of any task is always praised by the authoritative persons.

Application of *Dashavidha Parikshya Bhava* in research can be interpreted in comparative method in Table 1.

It is required to show the applicability of ancient methods of research in the present era in various fields of research confined to Ayurveda such as fundamental, literary, clinical and drug research. The traditionally established truths need to be validated in scientific manner. Validation of ancient methods of investigation or research will ultimately lead to establishment of Ayurveda as a science which contributes to broad domain of Indian research methodology.

## Conclusion

Research follows a rational way of establishing facts. Scientific investigation is the key point in all types of research. *Charakokta Dashavidha Parikshya Bhava* (tenfold of investigation) are one of the evidence of critical scientific approach of Ayurveda. These can be considered as a validation of ancient research methods and can be fully correlated with contemporary or current research methodology.

*Dashavidha Parikshya Bhava* (tenfold of investigation) are instrumental not only for planning of research in every field, but any organized work would get benefitted by it. The desired objectives can be achieved if proper planning is done beforehand with the help of tenfold of investigation (*Dashavidha Parikshya Bhava*).

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### Conflicts of interest

There are no conflicts of interest.

**Table 1: Discription of Dashavidha Parikshya Bhava**

<b>Dashavidha Parikshya Bhava</b>	<b>In treatment</b>	<b>In research</b>
<i>Karana</i> (cause or reason)	<i>Bhishak</i> (physician)	Researcher
<i>Karana</i> (instrument)	<i>Bheshaja</i> (drugs)	Research methods, investigational products and procedures
<i>Karyayoni</i> (source of action)	<i>Dhatu-Vaishmya</i> (state of imbalance of <i>Dosha-Dhatu-Mala</i> )	The research problem and formulation of hypothesis
<i>Karya</i> (action itself)	<i>Dhatu -Samya</i> (state of equilibrium of <i>Dosha-Dhatu-Mala</i> )	Aims and objectives of the study and purpose of the research study
<i>Karyaphala</i> (outcomes)	<i>Sukha/Arogya-Prapti</i> (attainment of health)	Expected outcomes of research and primary (direct) and secondary (surrogate) endpoints
<i>Anubandha</i> (subsequent manifestation)	<i>Dirghayu</i> (longevity)	Long-term effects of research study, impacts of research on society, and teleological ethics
<i>Desha</i> (habitat)	Both the land and the patient	Study site, geographical distribution, and selection of representative sample
<i>Kala</i> (season)	The year consisting of seasons and the state of the disease	Time period of study, study duration, and epidemiological studies - types of correlational or analytical study
<i>Pravritti</i> (initiation of action)	Consistent efforts of a physician toward treatment and therapeutic action	Motivation for research and ethical and scientific aspects involved in research for accomplishment of objective of the study
<i>Upaya</i> (means of action)	Excellence of the physician and the correctness of the therapy	Excellence of researcher, proper selection and definition of research problem, and formulation of hypothesis - overall planning

## References

- Kothari CR. Research Methodology Methods & Techniques. 2<sup>nd</sup> Revised ed. New Delhi: New Age International Publishers; 2009. p. 2.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Sutra Sthana. Ch. 20, Ver. 20. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 115.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Sutra Sthana. Ch. 10, Ver. 5. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 65.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 68. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 272.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 6. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 262.
- Sharma SV, editor. Tarkasamgraha of Annambhatt, Parichcheda P, 4<sup>th</sup> ed. Varanasi: Chaukhambha Sanskrit Sansthan; 2003. p. 35.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 69. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 272.
- Sharma SV, editor., Tarkasamgraha of Annambhatt, Parichcheda P, 4<sup>th</sup> ed. Varanasi: Chaukhambha Sanskrit Sansthan; 2003. p. 38-41.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Sutra Sthana. Ch. 9, Ver. 10. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 63.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 86. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 274.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 70. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 272.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 84. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 274.
- Available from: <http://thesishub.org/all-you-need-to-know-about-research-methodology/>. [Last accessed on 2017 Apr 18].
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 71. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 273.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 88. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 275.
- Kothari CR. Research Methodology Methods & Techniques. 2<sup>nd</sup> Revised ed. New Delhi: New Age International Publishers; 2009. p. 24.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 72. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 272.
- Acharya YT, editor. Charaka Samhita of Agnivesha Vimana Sthana. Ch. 8, Ver. 89. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 275.
- Kothari CR. Research Methodology Methods & Techniques. 2<sup>nd</sup> Revised ed. New Delhi: New Age International Publishers; 2009. p. 4.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 73. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 273.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 90. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 276.
- Available from: <https://www.fda.gov/downloads/Training/ClinicalInvestigatorTrainingCourse/UCM337268.pdf>. [Last accessed on 2018 Feb 21].
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 74. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 273.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 91. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 276.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 75. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 273.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 92. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 276.
- Wieczorek, WF, Delmerico AM. Geographic Information Systems. WIREs Computational Statistics. Vol. 2., Ch. 1. Wiley Online Publications; 2009. p. 167-86. <https://onlinelibrary.wiley.com/doi/abs/10.1002/wics.21> [Last accessed on 2018 Feb 21].
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 76. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 273.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 125. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 281.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 77. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 273.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 78. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 273.
- Acharya YT, editor. Charaka Samhita of Agnivesha, Vimana Sthana. Ch. 8, Ver. 14. Reprint edition. Varanasi: Choukhambha Surbharati Prakashan; 2005. p. 264.