



Review Article

CHARAKA SAMHITA IN THE LIGHT OF GANITHA SHASTRA

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ABSTRACT

Mathematics plays an inevitable role in medical science. Numbers are very essential in providing information to doctors, nurses, as well as patients. In ancient India, the place of modern mathematics was occupied by *Ganitha shastra*. *Ganitha shastra* is defined as the science and art of computation that has its origin in India. It deals with various branches like mathematics, computing, logic, analytics etc. It is a dominant part of Indian culture and heritage. It has its influence on other Indian systems like Ayurveda. Many examples which authenticate that Ayurveda has not ignored *Ganitha Shastra* are traceable in classics like *Charaka Samhita*. *Charaka Samhita* is an age old Ayurveda compendium which is known for its effective conglomeration of medicine and philosophy. This article is intended for analyzing the influence and utility of *Ganitha shastra* in *Charaka Samhita*.

INTRODUCTION

Mathematics plays an inevitable role in medical science. Numbers are very essential in providing information to doctors, nurses, as well as patients. In ancient India, the place of modern mathematics was occupied by *Ganitha shastra*. *Ganitha shastra* is defined as the science and art of computation that has its origin in India. *Ganitha shastra* deals with various branches like mathematics, computing, logic, analytics etc. It is a dominant part of Indian culture and heritage. It has its influence and utility in other sciences like Ayurveda. *Agnivesa Tantra*, written by *Agnivesa* and redacted by *Charaka* in the name of *Charaka samhita*, is an age old compendium of Indian medicine. It is an interesting work which effectively conglomerates medicine and philosophy. Many examples which authenticate the utility and influence of *Ganitha Shastra* in Ayurveda are traceable in *Charaka Samhita*. This article is intended for analyzing the influence and utility of *Ganitha shastra* in *Charaka Samhita*.

MATERIALS AND METHODS

In order to obtain knowledge regarding the topic, the related references have been collected from *Charaka samhita* along with Ayurveda *Deepika* commentary of *Chakrapanidutta*. The collected references has been systematically analyzed, contrasted and represented.

RESULTS AND DISCUSSION

Meters and mathematics

Meters are one among six auxiliary disciplines created by the custodians of Vedic tradition in order to preserve the structure and purity of literary texts. It also possesses a brilliant mathematical tradition that can be calculated with modern mathematics. *Charaka samhita* is composed in the form of both verses and prose's. Among the verses, the most used meter is identified as *Anushtup*. In verses of *Anushtup* meter, each *Pada* consists of 8 letters and among them 5th letter is always *Laghu* and 6th letter is always *guru*. The 7th letter of even *Pada* is *Laghu* and that of odd *Pada* is *guru*. Others have no bar. After each *Pada* there is a slight pause. The overall structure of *Anushtup* meter is illustrated in table no.1. It is an interesting fact that the summarizing verses of all chapters are composed in *Anushtup* meter. It is evident that the author is precise in amalgamating the life science with the mathematical tradition of meters.

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Table no. 1 Illustration of Anushtup meter

Pada 1	1	2	3	4	5	6	7	8
					Laghu	Guru	Guru	

Pada 2	1	2	3	4	5	6	7	8
					Laghu	Guru	Laghu	

Pada 3	1	2	3	4	5	6	7	8
					Laghu	Guru	Guru	

Pada 4	1	2	3	4	5	6	7	8
					Laghu	Guru	Laghu	

The auspicious “eight”

The number eight is considered as divine and auspicious in Sanskrit literature. Thus most of the authentic treatises written in Sanskrit language used *Ashtapadasutra* as the beginning colophon. It is followed in *Charaka samhita* also. The *Sutrasthana* of *Charaka samhita* starts with the aphorism “*Athato Deerghanjeeviteeyam adhyayam vyakhyasyamah*”. It consists of eight words and is considered auspicious by *Chakrapanidutta*. Moreover the number of *Jnanadevata* is also eight. It is quoted that the goddesses of *Buddhi*, *Siddhi*, *Smriti*, *Medha*, *Dhriti*, *Keerthi*, *Kshama* and *Daya* constitute *Ashta jnanadevata*.^[1]

Maxims and Mathematics

A *Nyaya* (maxim) is defined as an expression of general truth or principle. Authors of Ayurveda treatises found it as an easy tool for the clarification of the views what they want to put forth in their lexicon. In *Charaka samhita*, an abundant use of *Nyaya* for the clarification of verses is seen. Some of the maxims have their utility of numbers in it. *Kapinjalahikarana nyaya* is such an example. *Kapinjala* is a type of bird. In *Brahmana granthas*, *Kapinjalanalabheta vidhi* is mentioned. It denotes the sacrifice of *Kapinjala* birds. But the exact number of birds is not mentioned. This

doubt arises because the used word “*Kapinjalanam*” is pleural, so that it can be inferred that at least three birds should be killed. *Chakrapanidutta* mentioned this *Nyaya* in the context of *Chitrakadi gutika*.^[2] For explaining the word ‘*Lavanani*’ in the *Yoga*, he used this *nyaya*. As per this *Nyaya*, only three salts are to be used for making this *Gutika*. But in the present context he advised to use 5 types of salt described in *Sutrasthana*, by rejecting this *Nyaya*.

Grouping based on numbers

The utility of number groups are evident from the structuring of *Charaka samhita Sutrasthana* itself. Its 30 chapters are categorized into seven *Chatushka* and two *Sangraha adhyayas*. Whereas *Chatushka* denotes a group of four chapters. The names of *Chatushka* are tabulated in table no.2. Like *Chatushka*, the utility of *Trika* (group of three) are also seen in *Charaka samhita*. The 11th chapter of *Sutrasthana* named ‘*Tisraishaneeyam*’ comprises of ‘*Ashtatrika*’ as its main content. Likewise, ‘*Ashtatrika*’ is also described in the context of *Madatyaya chikitsa* in *Charaka samhita*.^[3] Both of them are tabulated in table no.3.

Table 2: Classification of chapters into Chatushka

S.No	Name of <i>Chatushka</i>	Chapters
1	<i>Bheshaja Chatushka</i>	1-4
2	<i>Swastha Chatushka</i>	5-8
3	<i>Nirdesha Chatushka</i>	9-12
4	<i>Kalpana Chatushka</i>	13-16
5	<i>Roga Chatushka</i>	17-20
6	<i>Yojana Chatushka</i>	21-24
7	<i>Annapana Chatushka</i>	25-28

Table 3: Ashtatrika in Tisraishaneeyam and Madatyaya chikitsa

Sl.No	Ashtatrika in Tisraishaneeyam	Ashtatrika in Madatyaya chikitsa
1	Eshana traya	Trividham annam
2	Traya upasthamba	Trividham panam
3	Trividham balam	Trividha vayah
4	Treeni ayatanani	Trividha vyadhi
5	Trayo rogah	Trividha bala
6	Trayo rogamargah	Trividha kala
7	Trividha bhishajah	Tridosha
8	Trividham oushadham	Trividha satva

Numbers expressing the Fundamentals of Ayurveda

The number 'three' is the most important in this context as it is used to express *Tridosha*, *Trisutra*, *Trayopasthamba* etc. It is already mentioned that 'Tisraishaneeyam' chapter of *Sutrasthana* is meant for explaining the 'Ashtatrika'. Likewise, the number 'five' is expressive of *Panchamahabhuta*, which is the core concept of Ayurveda. Similar in the case of *Saptadhatu*, *Ekadasha indriya*, *Trayodasha srotas*, *Trayodasha agni*, etc. Thus numbers play an important role in the specific understanding and discrimination of aforesaid basic principles.

Five hundred under fifty

It is an interesting fact that, the main subject matter dealt in *Shadvirechanashatasriteeyam* is based on the number five and its multiples. It includes *Panchakashayakalpna* (five types of *Kashaya kalpna* viz. *Swarasa*, *Kalka*, *Shrita*, *Sheeta* and *Phanta*), *Pancha kashaya yoni* (all *Rasas* except *Lavana*), *Panachashan mahakashaya* (50 *Mahakashaya*) and *Pancha*

kashayashata (500 *Kashaya*). Here the term *Mahakashaya* is indicative of a group of ten drugs having a specific action. Each drug can be taken as a single *Kashaya*. *Chakrapanidutta* commented that this summarized description of five hundred under fifty is meant for less intelligent people and it will serve as an example for wise ones. This grouping is very much similar to the cluster analysis, which is a common technique for statistical data analysis. It is the task of grouping a set of objects in such a way that the objects in the same group are more similar.

Debate over numbers

Charaka samhita is known for its methodology of deriving conclusions through debates. Around three chapters of *Charaka samhita* is based on debates. *Atreyabhadrakapya* is such a chapter. Interestingly the debate between ten scholars is based on the number of *Rasa* and is tabulated in table no.4

Table 4: Debate over number of Rasa [4]

Sl.No	Name of Scholar	Number of rasa
1	<i>Bhadrakapya</i>	1
2	<i>Shakunteya Brahmana</i>	2
3	<i>Purnaksha Moudgalya</i>	3
4	<i>Hiranyaksha Koushika</i>	4
5	<i>Kumarashira Bharadwaja</i>	5
6	<i>Varyovida</i>	6
7	<i>Nimi</i>	7
8	<i>Badisha Dhamargava</i>	8
9	<i>Kankayana</i>	<i>Aparisamkhyeya</i>
10	<i>Punarvasu Atreya</i>	6

Samkhya as a guna

Samkhya is defined as *Ganitham* in *Charaka samhita*.^[5] It is listed as one among the *Paradi guna*. *Chakrapani* further commented that it is meant for obtaining accurate knowledge about the status. The statement "Jwara is of several types" provides a vague

idea only. However the statement "Jwara is of eight types" will provide an explicit idea about it.

Specific chapter based on Samkhya Samprapthi

'Ashtodareeyam' is the 19th chapter of *Charaka samhita sutrasthana*, which is dedicated for the

description of specific types of 48 diseases. This chapter is based on *Samkhya samprapthi*, which is later described in *Nidana sthana*. The ending aphorism of the chapter states that there are three diseases having twenty variants each, three diseases having one

variant each, eight diseases having two each, ten diseases having four each, twelve diseases having five each, two diseases having six each and three diseases having seven variants each. The numerical classification of diseases is tabulated in Table no.5

Table 5: Numerical classification of diseases

S No.	Diseases	Number of types
1.	<i>Udara</i>	8 types
2.	<i>Mutraghata</i>	8 types
3.	<i>Ksheeradosha</i>	8 types
4.	<i>Rethodosha</i>	8 types
5.	<i>Kushta</i>	7 types
6.	<i>Pidaka</i>	7 types
7.	<i>Visarpa</i>	7 types
8.	<i>Atisara</i>	6 types
9.	<i>Udavarta</i>	6 types
10.	<i>Gulma</i>	5 types
11.	<i>Pleehadosha</i>	5 types
12.	<i>Kasa</i>	5 types
13.	<i>Shvasa</i>	5 types
14.	<i>Hikka</i>	5 types
15.	<i>Trishna</i>	5 types
16.	<i>Chardi</i>	5 types
17.	<i>Bhaktasya anashanasthana</i>	5 types
18.	<i>Shiroroga</i>	5 types
19.	<i>Hridroga</i>	5 types
20.	<i>Panduroga</i>	5 types
21.	<i>Unmada</i>	5 types
22.	<i>Apasmara</i>	4 types
23.	<i>Akshiroga</i>	4 types
24.	<i>Karnaroga</i>	4 types
25.	<i>Pratishyaya</i>	4 types
26.	<i>Mukharoga</i>	4 types
27.	<i>Grahanidosha</i>	4 types
28.	<i>Mada</i>	4 types
29.	<i>Murcha</i>	4 types
30.	<i>Shosha</i>	4 types
31.	<i>Klaivya</i>	4 types
32.	<i>Shopha</i>	3 types
33.	<i>Kilasa</i>	3 types
34.	<i>Lohitapitta</i>	3 types
35.	<i>Jwara</i>	2 types
36.	<i>Vrana</i>	2 types

37.	<i>Ayama</i>	2 types
38.	<i>Gridhrasi</i>	2 types
39.	<i>Kamala</i>	2 types
40.	<i>Ama</i>	2 types
41.	<i>Vatarakta</i>	2 types
42.	<i>Arshas</i>	2 types
43.	<i>Urusthamba</i>	1 type
44.	<i>Sannyasa</i>	1 type
45.	<i>Mahagada</i>	1 type
46.	<i>Krimi</i>	20 types
47.	<i>Prameha</i>	20 types
48.	<i>Yonivyapat</i>	20 types

Measurements in Charaka Samhita

In *Sareera sthana*, a specific chapter named *Sareera sankhya sareera* is dedicated for the numerical study of the body. The author has logically divided the chapter into a section on “countable” constituents of the human anatomy, followed by a section that cannot be counted, or in some cases, even be seen with the naked eye. The method of *Anjali pramana* is used to measure bodily constituents or *Rasadi dhatu* in this

chapter. It is tabulated in table no.6. Whereas in *Vimanasthana*, the method of *Anguli pramana* (the measure of individual fingers in terms of height, breadth, and length respectively) is used for the examination regarding measurement of body. The entire body measures eighty four *Anguli* according to *Charaka Samhita*.^[6]

Table 6: Anjali pramana ^[7]

Sl. No	Dravya	Anjali pramana
1	<i>Udakam</i>	10 Anjali
2	<i>Rasa</i>	9 Anjali
3	<i>Shonita</i>	8 Anjali
4	<i>Pureesha</i>	7 Anjali
5	<i>Sleshma</i>	6 Anjali
6	<i>Pitta</i>	5 Anjali
7	<i>Mutra</i>	4 Anjali
8	<i>Vasa</i>	3 Anjali
9	<i>Medas</i>	2 Anjali
10	<i>Majja</i>	1 Anjali
11	<i>Mastishka</i>	½ Anjali
12	<i>Shukra</i>	½ Anjali
13	<i>Slaishmika ojas</i>	½ Anjali

In the Nomenclature of Medicines

The numbers play an important role in the nomenclature of various medicines in *Charaka samhita*. Most of them are named on the basis of total number of ingredients in it. For eg *Ashtachurna* with total eight ingredients, *Shadangapaniya* with total six ingredients, etc. Moreover, drug groups like *Dasamula*, *Triphala*, *Trikatu* etc also followed the same criteria. While some of them are named on the basis of quantity of its ingredients. For eg in *Ksheerashatpala ghrta*, the

total quantity of its constituents, viz. *Panchakola* and *Yavakshara* is six *Pala*.^[8]

Utility of Ascending and Descending order of Numbers

Utility of ascending and descending orders of numbers can be seen in *yoga* like *Varthamana pippali*. In the case of *Varthamana pippali*, ten *Pippali* should be taken with milk on the first day. From the second day onwards up to the tenth day, ten *Pippali* should be

increased daily. From the eleventh day, the number of fruits should be decreased gradually in the same order till it comes to ten. The usage of total 1000 *Pippali* in this way causes *Rasayana* effect.^[9]

Utility of numbers in *Chikitsa*

The utility of numbers in treatment can be explained using the following examples. The general treatment of *Jwara* can be classified into treatment up to 6 days, from 6 to 10 days and after 10 days. Treatment is structured in such a way that there are dos and don'ts to be followed in each stage. For eg. *Kashaya* is contraindicated up to first 6 days of *Jwara* (or until the *Ama* gets *Pachana* completely). While either *Pachana* or *Shamana Kashaya* is advised after 6th

day with respect to the condition. Likewise, the dosage of medicines and its time period for usage is also expressed in numbers. E.g. The mode of usage of *Shilajatu rasayana* is threefold viz. for seven weeks, three weeks and one week regarded as *Pravara*, *Madhyama* and *Avara*. The dosages are 1 *Pala*, ½ *Pala* and 1 *Karsha* respectively.^[10]

Classification of Age

Age is defined as the length of time during which a being or thing has existed. Both of these entities are calculated on a mathematical basis. Special importance is given to both of these entities in *Charaka Samhita*. The classification of age is tabulated in table no.7.

Table 7: Classification of age ^[11]

Sl No	Age	Terminology
1	Up to 30 years	<i>Balam</i>
2	30 - 60 years	<i>Madhyam</i>
3	60-100 years	<i>Jeernam</i>

Combinatorics of *Rasa* and *Dosha*

Charaka samhita give special emphasis in explaining the possible combinations exist for each particular grouping of *Rasa*. The treatise states sixty three combinations of *Rasa*. *Mahavira*, the renowned Jain mathematician is identified to be the first author who presented an algorithm of combinations for this problem. He explained the aforesaid algorithm named *Prastarayogabheda sutra*, in his treatise *Ganithasara sangraha*.^[12] According to this method, in order to calculate the possible combinations of six items (here *rasa*), they should be written in ascending order and descending order respectively in an upper and lower row. i.e.,

1 2 3 4 5 6
6 5 4 3 2 1

The number of possible combinations of a single *Rasa* can be calculated by taking first fraction from the right. Likewise, the possible combinations of two *rasa* can be calculated by multiplying the first two fractions from the right and so on. Thus,

- The number of possible combinations of a single *Rasa* = $6/1 = 6$
- The number of possible combinations of a two *Rasa* = $5/2 * 6/1 = 15$
- The number of possible combinations of a three *Rasa* = $4/3 * 5/2 * 6/1 = 20$
- The number of possible combinations of a four *Rasa* = $3/4 * 4/3 * 5/2 * 6/1 = 15$
- The number of possible combinations of a five *Rasa* = $2/5 * 3/4 * 4/3 * 5/2 * 6/1 = 6$
- The number of possible combinations of a six *Rasa* = $1/6 * 2/5 * 3/4 * 4/3 * 5/2 * 6/1 = 1$

However, the method of taking combinations of *Doshas* used in *Charaka samhita* is quite complex. Sixty two combinations are described in *Charaka samhita*. This combination seems to be an incomplete merging of two principles of enumeration, one on simple terms of *Sama*, *Vridhhi* and *Kshaya*, while the other based on three degrees of *Vridhhi* and *Kshaya*. i.e., *Ativridhhi*, *Vridhhitara*, *Vridhhitama*, *Atiksheena*, *Ksheenatarata* and *Ksheenatama*.

CONCLUSION

Ganitha Shastra is a dominant part of Indian culture and heritage. It has its influence on other Indian systems like *Ayurveda*. Many examples which authenticate that *Ayurveda* has not ignored *Ganitha Shastra* are traceable in classics like *Charaka Samhita*. The utility of *Ganitha Shastra* is evident even in the structural aspects of *Charaka Samhita*. *Acharya Charaka* considers *Ganitha* as one among *Paradi guna* also. He even dedicated a chapter for describing the diseases based on *Samkhya samprapti*. *Ganitha* also has its utility in the expression of fundamentals of *Ayurveda*, Combinatorics of *Rasa* and *Dosha*, classification of age, nomenclature of medicines, dosage, etc. It is evident from the examples that *Ganitha Shastra* occupied the present position of modern mathematics in ancient Indian sciences. Thus it is clear that *Ganitha Shastra* was a crucial player within the healthcare arena then.

REFERENCES

1. Agnivesa, *Charaka samhita* with *Ayurveda deepika* commentary, *Vaidya Jadavji Trikamji Acharya*, editor. *Sutrasthana*, chapter 1, Verse no.39, *Choukhamba Publications*, New Delhi, Reprint, 2017; 8.

2. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Chikitsasthana, chapter 15, Verse no.96, Choukhamba Publications, New Delhi, Reprint, 2017; 520.
3. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Chikitsasthana, chapter 24, Verse no.68, Choukhamba Publications, New Delhi, Reprint, 2017; 586.
4. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Sutrasthana, chapter 26, Verse no.8-9, Choukhamba Publications, New Delhi, Reprint, 2017; 135.
5. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Sutrasthana, chapter 26, Verse no.29-30, Choukhamba Publications, New Delhi, Reprint, 2017; 141.
6. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Vimanasthana, chapter 8, Verse no.117, Choukhamba Publications, New Delhi, Reprint, 2017; 279.
7. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Sareerasthana, chapter 7, Verse no.15, Choukhamba Publications, New Delhi, Reprint, 2017; 339.
8. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Chikitsasthana, chapter 5, Verse no.147, Choukhamba Publications, New Delhi, Reprint, 2017; 443.
9. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Chikitsasthana, chapter 1.3, Verse no.36-40, Choukhamba Publications, New Delhi, Reprint, 2017; 385.
10. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Chikitsasthana, chapter 1.3, Verse no.53-55, Choukhamba Publications, New Delhi, Reprint, 2017; 386.
11. Agnivesa, Charaka samhita with Ayurveda deepika commentary, Vaidya Jadavji Trikamji Acharya, editor. Vimanaasthana, chapter 8, Verse no.122, Choukhamba Publications, New Delhi, Reprint, 2017; 280.
12. Mahaviracharya, The Ganitha sara sangraha with English translation and notes, M.Rangacharya, translator, chapter 6, Verse no.219, Government press, Madras, 1913; 94.

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