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STUDY THE CHANGES IN QUALITIES OF LAKE WATER ACCORDING TO SHAD-RUTU W.S.R. TO SUSHRUTA SAMHITA

Dr. Vinod S. Koravi*

Associate Professor MD. PhD (Sch), LRP Ayurvedic Medical College, Islampur.

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***Corresponding Author**
Dr. Vinod S. Koravi
Associate Professor MD. PhD (Sch), LRP Ayurvedic Medical College, Islampur.

ABSTRACT

Water is a basic need of human beings. It is essential either directly or indirectly to almost all activities of man. It has great role to play in socio-economic development of human population. It is most essential for agriculture, domestic animals, and poultry, for drinking purposes and for household purposes like cleaning utensils. Environmental changes may affect on water qualities according to Shad rutu. This changes in quality further guides us about what kind of treatment should be applicable for water to make it wholesome or pure or safe for drinking. So to find out the changes in qualities of Lake water source according to shud rutu this topic has been selected.

KEYWORDS: Shad Rutu, Lake, Water.

INTRODUCTION

Water is a basic need of human beings. It is essential either directly or indirectly to almost all activities of man. It has great role to play in socio-economic development of human population. It is most essential for agriculture, domestic animals, and poultry, for drinking purposes and for household purposes like cleaning utensils.

The main functions of Jala are Jeevana, Tarpana, Hridya, Buddhi prabodhana, Sheet etc. Without water there is no acuity in both the healthy and the diseased person. Water is the sustainer of life for all living being. It is the principle chemical constituent of the body composing approximately 55-65% of the body weight of an adult.

Acharya Sushrut has mentioned two basic sources of water.

1. Divya Jala

2. Bhoumya Jala

In Divya Jala he explained changes in qualities of water according to Shad rutu in detail. Bhoumya Jala is further divided into seven sources.

तत् पुन: सप्त् विधम् ॥.

तद्यथा कौपं, नादेयं, सारसं, ताडाग् ॥.

प्रास्त्रवण्म्, औद्भिदं, चौण्ड्यमिती ॥ सु. सु.४७/७.

He also defined the qualities of above seven sources of water in detail after this he mentioned the best source of water in Shud rutu.

तत्र वर्षास्वान्तरिxऔद्भिद् वा सेवेत, महागुण् त्वात् ॥.

शरदि सर्व, प्रस्न्नत्वात् हेमंते सारसम् ताडागम् वा; वसन्ते कौ प्रास्त्रव वा; ॥.

ग्रीYmaopooयवम्; प्रावृपि चौण्ड्य मनभिवृYT\ma\ सर्वच्चेति ॥ सु.सु. ४७/८s.

During Varsa rutu atmospheric water or water from spring may be used, because of their profound good qualities, during Sharad rutu all kinds of water may be used because of being clear, during Hemant Rutu water of either natural lake or artificial lake may be used, during Vasant water of artificial tank or a spring may be used & in Grishma also in the same manner, during Pravrutta water collected in burrows & all other kinds which are not from rain may be used.

But there is no explanation of changes in qualities of bhauma jala according to Shud rutu in Sushrut Samhita as well as any other ayurvedic text.

Pure uncontaminated water does not occur in nature, It contains impurities of various kinds that is natural & manmade. The natural impurities are dissolved gases & dissolved minerals. A more serious aspect of water pollution is that caused by human activity urbanization & industrialization. The sources of pollution resulting from these are sewage, Industrial & trade wastes, Agricultural products and Physical pollutants.

Environmental changes may affect on water qualities according to Shud rutu. This changes in quality further guides us about what kind of treatment should be applicable for water to make it wholesome or pure or safe for drinking. So to find out the changes in qualities of Lake water source according to shad rutu this topic has been selected.

AIM

- To study the changes in qualities of Lake water source according to Shad-Rutu.

OBJECTIVES

- Comparative study of the qualities of Lake water according to Shad-Rutu.

MATERIAL AND METHODOLOGY

MATERIAL

- Water – Raw water from Lake.
- Instruments
  - Turbiditimeter
  - Thermometer
  - Instruments for Titration
  - pH meter
  - Standard Glass fiber filter
  - Evaporation Apparatus
  - Instruments & reagents for MPN Method

INCLUSION CRITERIA

For water: Lake source will be taken.

EXCLUSION CRITERIA

Other drinking water sources mentioned in samhita.

METHODOLOGY

Study Design - Experimental Study

- Minimum 2 liter Water will be collected from Lake water source.
- Raw water sample will be immediately brought into laboratory for the estimation of various physical – chemical- bacteriological parameters as per laboratory requirement.
- Same procedure will be done in every rutu according to Ayurveda i.e. Varsha, Sharad, Hemant, Shishir, Vasant & Grishma.

PARAMETER FOR ASSESSMENT

1. Ayurvedic Parameters

a) Gandha

b) Shitata / Ushata

c) Shudhi (Avilata)

d) Rasa

2. Modern Parameters

- **Physical** – **a)** Colour

b) Odour

c) Turbidity

d) Temperature

- **Chemical-a)** Hardness

b) pH

c) Total suspended solids.

d) Total dissolved solids.

- **Microbiological**

Bacteriological Indicator (MPN)

CRITERIA FOR ASSESSMENT

Assessment of water sample will be done according to above parameters & textual references.

OBSERVATION AND RESULTS

A) Ayurvedic Parameters.

Table no. 1: Gandha.

RUTU	LAKE
Varsha	Sgandha
Sharad	Nirgnadha
Hemant	Nirgnadha
Shishir	Nirgnadha
Vasant	Nirgnadha
Grishma	Nirgnadha

Table no. 2: Shudhi.

RUTU	LAKE
Varsha	Heen
Sharad	Pravar
Hemant	Madhyam
Shishir	Madhyam
Vasant	Madhyam
Grishma	Madhyam

Table no. 3: Shitata.

RUTU	LAKE
Varsha	Shit
Sharad	Shit
Hemant	Shit
Shishir	Shit
Vasant	Shit
Grishma	Shit

Table no 4: Rasa.

RUTU	LAKE
Varsha	Avyakta
Sharad	Avyakta
Hemant	Avyakta
Shishir	Avyakta
Vasant	Avyakta
Grishma	Avyakta

B) Physical Parameters

Table No. 5: Colour.

RUTU	LAKE
Varsha	Turbid
Sharad	colourless
Hemant	colourless
Shishir	colourless
Vasant	colourless
Grishma	colourless

Table No. 6: Odour.

RUTU	LAKE
Varsha	Unobjectionable
Sharad	Unobjectionable
Hemant	Unobjectionable
Shishir	Unobjectionable
Vasant	Unobjectionable
Grishma	Unobjectionable

Table No. 7: Turbidity.

Turbidity in NTU	
	Lake
Varsha	3.9
Sharad	3.5
Hemant	3.6
Shishir	3.7
Vasant	3.8
Grishma	3.6
AVERAGE	3.68

Table No. 8: Temprature.

Temprature in ^{0}F	
	Lake
Varsha	97.2
Sharad	97.1
Hemant	97.2
Shishir	97.2
Vasant	97.4
Grishma	97.3
AVERAGE	97.23

C) Chemical Parameters.

Table No. 9: Hardness.

Hardness in mg/L	
	Lake
Varsha	362
Sharad	324
Hemant	334
Shishir	333
Vasant	328
Grishma	327
AVERAGE	334.67

Table No 10: pH.

pH	
	Lake
Varsha	7.5
Sharad	7.2
Hemant	7.3
Shishir	7.4
Vasant	7.4
Grishma	7.3
AVERAGE	7.35

Table No. 11: Total Suspended Solids.

T.S.S. in mg/L	
	Lake
Varsha	11.2
Sharad	10.5
Hemant	10.9
Shishir	10.8
Vasant	10.6
Grishma	10.7
AVERAGE	10.8

Table No. 12: Total dissolved solids.

T.D.S. in mg/L	
	Lake
Varsha	264
Sharad	235
Hemant	244
Shishir	243
Vasant	240
Grishma	239
AVERAGE	244.17

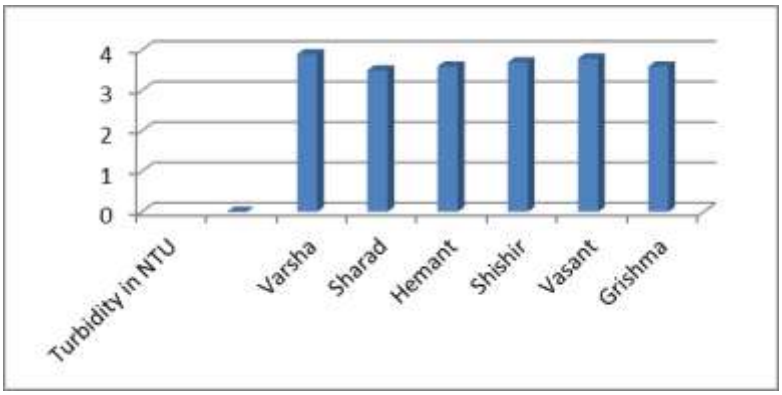
Table No. 13: Microbiological – Bacteriological Indicator (MPN).

MPN / 100 ml	
	Lake
Varsha	601
Sharad	350
Hemant	401
Shishir	403
Vasant	390
Grishma	421
AVERAGE	427.67

RESULTS

1) Turbidity of Lake water in shad rutu.

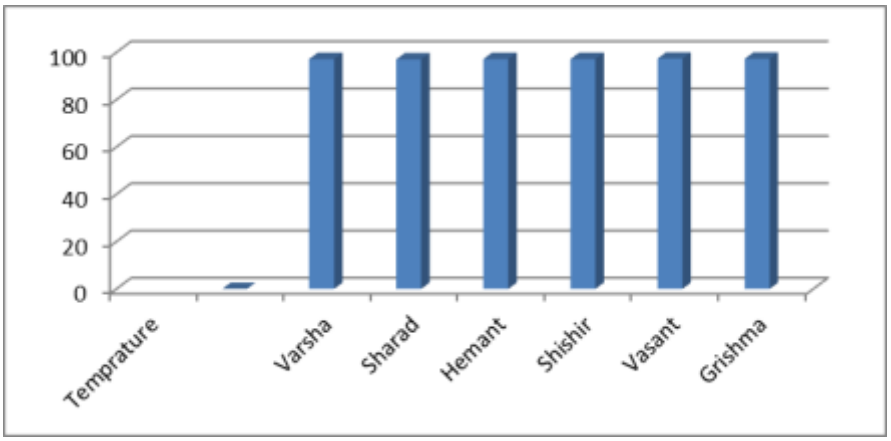
Turbidity in NTU	
	Lake
Varsha	3.9
Sharad	3.5
Hemant	3.6
Shishir	3.7
Vasant	3.8
Grishma	3.6
AVERAGE	3.68



1) The Turbidity of Lake water is more in Varsha rutu and less in Sharad rutu.

2) Temprature of water according to three sources in shad rutu.

Temprature	
	Lake
Varsha	97.2
Sharad	97.1
Hemant	97.2
Shishir	97.2
Vasant	97.4
Grishma	97.3
AVERAGE	97.23



The Temperature of Lake water is more in Vasant rutu and less in Sharad rutu.

3) Hardness of water according to three sources in shad rutu.

Hardness	
	Lake
Varsha	362
Sharad	324
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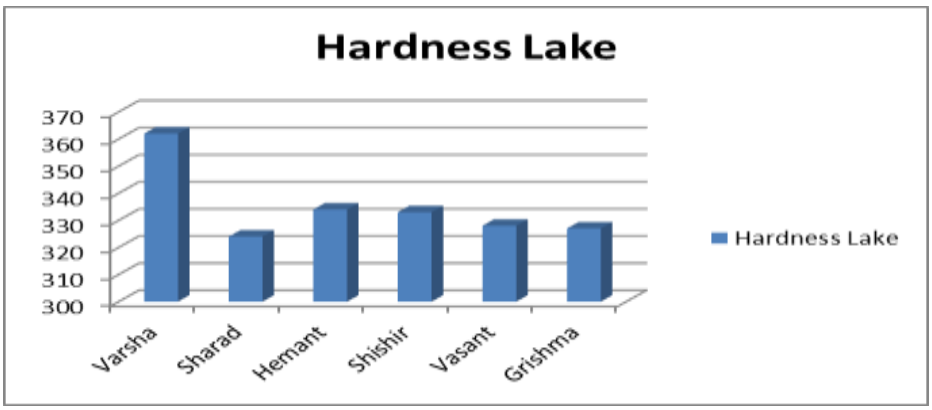
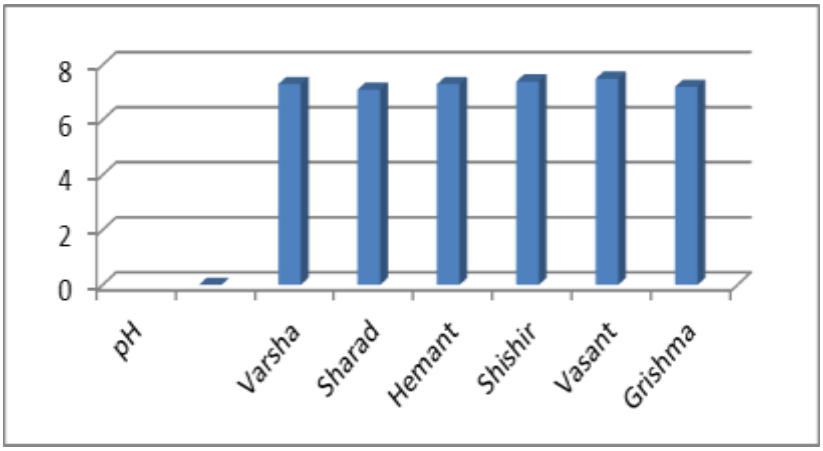
Shishir	333
Vasant	328
Grishma	327
AVERAGE	334.67



1) The Hardness of Lake water is more in Varsha rutu and less in Sharad rutu.

4) pH of water according to three sources in shad rutu.

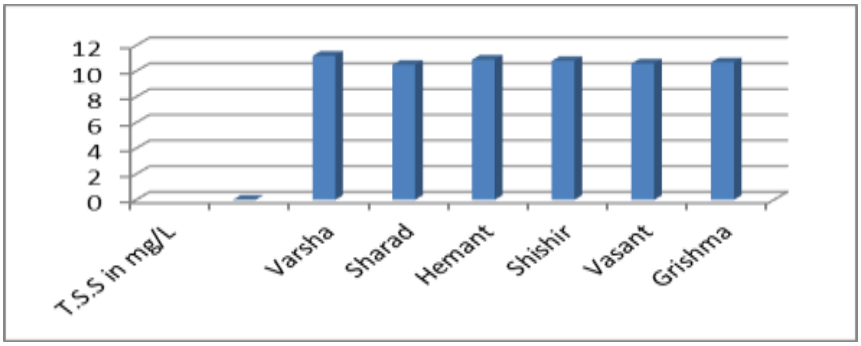
pH	
	Lake
Varsha	7.3
Sharad	7.1
Hemant	7.3
Shishir	7.4
Vasant	7.5
Grishma	7.2
AVERAGE	7.30



1) The pH of Lake water is more in Vasant rutu and less in Sharad rutu.

5) Total Suspended Solids of water according to three sources in shad rutu.

T.S.S in mg/L	
	Lake
Varsha	11.2
Sharad	10.5
Hemant	10.9
Shishir	10.8
Vasant	10.6
Grishma	10.7
AVERAGE	10.8



1) The T.S.S. of Lake water is more in Varsha rutu and less in Sharad rutu.

6) Total dissolved Solids of water according to three sources in shad rutu.

T.D.S. in mg/L	
	Lake
Varsha	264
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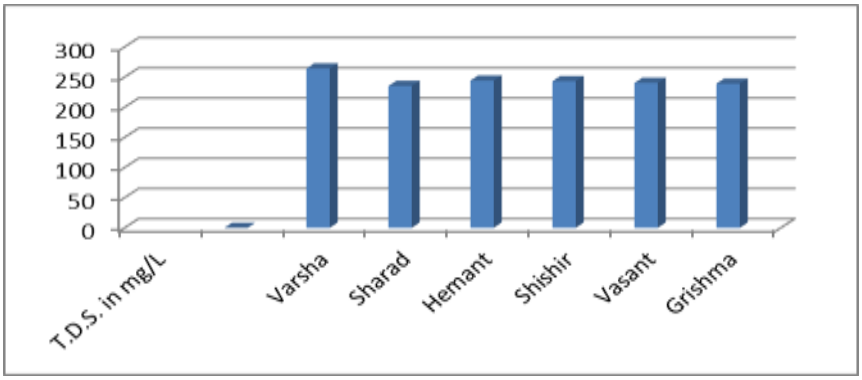

1) The T.D.S. of Lake water is more in Varsha rutu and less in Sharad rutu.

7) MPN of water according to three sources in shad rutu.

MPN /100 ml	
	Lake
Varsha	601
Sharad	350
Hemant	401
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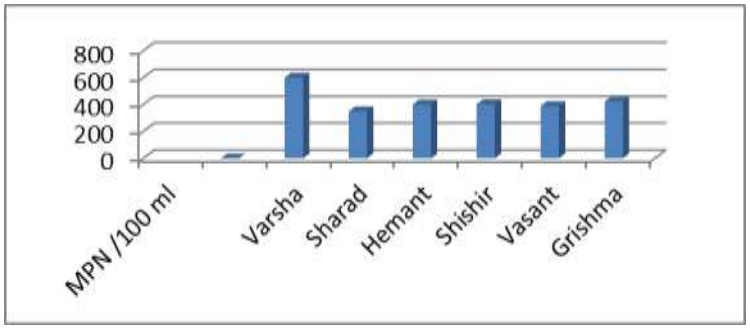
Vasant	390
Grishma	421
AVERAGE	427.67



1) The MPN of Lake water is more in Varsha rutu and less in Sharad rutu.

DISCUSSION

Water is lifeblood of the environment, essential to the survival of all living things Plant, animal and human and we must do everything possible to maintain it's quality for today and the future.

DISCUSSION ON RESULTS

In the present study water samples were collected from Lake to assess their Physical, Chemical and Bacterial status. As concern with ayurvedic parameters table no 1 showed Gandha. During Varsha rutu Lake water contaminated a lot that's why lake water have gandha.

Table no 2 showed Shudhi during Varsha rutu Lake water is more contaminated because of rain so in Varsha rutu heen shudhi is seen and in Sharad rutu pravar shudhi is seen and in remaing rutus madhyam shudi is seen.

Table no 3 showed Shitata. In every rutu all water become shit so Lake water in each rutu is shit.

Table no 4 showed Ras. Our samhita mentioned qualities of good water in that they mention Madhur and Kashya ras is good ras for drinking water. During Sharad rutu lake water ras is madhur.

Above mention ayurvedic parameters are subjective parameters.Now below mention parameters are objective parameters.

Table no 5 showed Colour. The colour of Lake water in Varsha rutu is turbid because in Varsha rutu lots of rain is going on so water of lake contaminated highly in other rutus colour of lake is colourless.

Table no 6 showed Odour. The odour of lake water in all rutu is unobjectionable.

As concern with Turbidity in table no 7 showed.

The Turbidity of Lake water is more in Varsha rutu and less in Sharad rutu. Varsha rutu lot of rain is going on so that during Varsha rutu all drinking water sources conataminated highly. In Sharad rutu our samhita said that because of Agastya star all water become amrut like and in Sharad rutu sun rays in day time are perpendicular and in night time the moon rays are very cold so the water which is hot in day time it become very cold in night time. Sharad rutu is very good rutu for lake water.

As concern with Temprature in table no 8 showed. The Temperature of Lake water is more in Vasant rutu and less in Sharad rutu. rutu.

As concern with Hardness in table no 9 showed. The Hardness of Lake water is more in Varsha rutu and less in Sharad rutu.

As concern with pH in table no 10 showed. The pH of Lake water is more in Vasant rutu and less in Sharad rutu.

As concern with T.S.S. in table no 11 showed. The T.S.S. of Lake water is more in Varsha rutu and less in Sharad rutu.

As concern with T.D.S. in table no 12 showed. The T.D.S. of Lake water is more in Varsha rutu and less in Sharad rutu.

As concern with MPN in table no 13 showed. The MPN of Lake water is more in Varsha rutu and less in Sharad rutu.

CONCLUSION

By an intensive literary review and based on experimental work following conclusions are drawn.

1. The experimental study uphold the Susrutas statements i.e., Qualities of drinking water sources changes accourding to shad rutu.
2. Qualities of Lake water is good in Sharad rutu and qualities are less in Varsha rutu.
3. Todays period and Samhita period environmental factors are very different, so in Samhita period water of any source during sharad rutu was used without any treatment for drinking but now a days its not safe because, todays environmental factors are different, lots of increasing population, Water pollution, Industrialization is going on so water of Lake sources in any rutu for drinking purpose should not be used without appropriate treatement.

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