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ORIGINAL RESEARCH ARTICLE

EXPERIMENTAL STUDY OF SUSHRUTOKTA JALAPRASADANA VIDHI WITH SPECIAL REFERENCE TO GOMEDA

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ABSTRACT

Context- Water being a basic need of human being, it is very essential that it stays pure & harmless to health. The water available these days is from various sources. As the source changes, the quality of water also differs. Water impurities are mentioned in *Ayurvedic* classics as one of the cause for *Janapadodhvamsa Vyadhi* (~epidemics / Natural calamities). To overcome them, many techniques are adopted today, like filters, purifiers & chemical agents. Even in *Ayurveda*, methods of purification of water have been mentioned. **Aim**- 1) To explore the *Jalaprasadana vidhi* with help of *Gomeda*(Hessonite) & try to establish standard for them. 2) To provide essential data & proper validation for *Jalaprasadana*. **Materials**- *Gomeda* was used in this study to purify water. Glass vessel and earthen vessels were used as containers. **Observations & Statistics**- The observed values were subjected to ANOVA test and unpaired 't' test. **Conclusion**- At the end of the study, it was observed that, *Gomeda* shows effect on impure water and can be used for many parameters of water impurity.

Key Words- Water, Purification, *Jalaprasaadana*, *Gomeda*

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INTRODUCTION

Water being a basic need of human being, it is very essential that it stays pure & harmless to health. The water available these days is from various sources. Going through the details of them we come to know that, there are many facets of it we need to think about. As the sources change, the quality of water changes, and as source changes, even the impurities of water change. To overcome these, many techniques are being adopted. For example, filters, purifiers & chemical agents.

Ayurveda has got elaborate description about water. There are many sources and types of water are mentioned in *Ayurveda Samhita*[1],[2]. We also find explanation about different factors which lead to harmful changes in water. These harmful changes are mentioned in *Ayurvediya Samhita* as one of the cause for *Janapadodhvamsa Vyadhi*[3]. Even in Ayurveda, the solution for such problem is mentioned in form of *Jalaprasaadana*. *Maharshi Sushruta* has mentioned methods of purification of water under the title *Kalushasya Prasaadana*[4]. He tells about seven ways of treatment for water impurities.

Sushruta Samhita was written thousands of years back. We can consider that the things which are mentioned by *Maharshi Sushruta* are with consideration of the conditions of water in those days. Although whole of the science they had described so long back, it is fully applicable even today. Considering the theories they had mentioned are applicable for all times, we can't neglect the possibility that even the purification methods will work today. Maharshi Sushruta has mentioned seven tools which are to be used to get better quality water. We also find that there is no elaborate description about the method of using the tools mentioned by *Maharshi Sushruta*. So the study was meant to explore the *Jalaprasadana vidhi* with help of *Gomeda* & try to establish standard for them.

Hence to provide essential data & proper validation a study was conducted which is being presented briefly in this paper.

***Jala* (Water)**- *Jala* is one of the 5 *Mahabhootas* which also represents the liquidity or liquid state. All *Mahabhoota* can be understood as per stages with the help of water as changes in state of water are easily evident.

Water being very important for living beings we find references about it and its qualities in *Ayurvaidic Samhita*. They have mentioned different types of water according to their sources and qualities. Water falling from sky in the form of rain is considered as the only type of *Jala*[5] by *Maharshi Charaka* as this water itself takes form of different other types of

found on earth. As the sources change, its quality also changes [6]. Along with qualities, the types of impurities also differ. Different types of impurities cause different defects.

Water Purification- For purification of water there are many methods available. These methods are either old methods which are being followed since long back, or the newly invented methods which are developed with highly advanced technology to overcome almost all kinds of water purity problems. Every defect of water requires different way of purification method. Similarly most of the time, every purification method is directed with some or other intention. Even these advanced techniques have their own specialization. Like filtration is meant for undissolved solids, UV (Ultra violet)[7] is for micro organisms, RO (Reverse osmosis)[8] is for minute impurities or organisms which are covered with solids and also hard water.

Maharshi Sushruta has mentioned about defects of *Jala* (Water). He called them as Kalusha. Water with such *Kalusha* should not be used. But he says if pure water is not available, then such water should be used after making it wholesome. He also told few tools which can make this *Kalushita Jala* acceptable. The tools mentioned in the Sushruta Samhita are Kataka(Strychnos Potatorum), *Gomeda*(Hessonite), Bisagranthi(Root of Lotus), Shaivala moola(Root of Algae), *Vastra*(Cloth), *Mukta*(Pearl) and *Mani*(Potash alum)[9]. Using these things one can get rid of the defects of water. The procedure to use these things is not explained in *Sushruta Samhita*. Same tools are mentioned in *Ashtanga Sangraha* but not procedures. The reason may be the consideration of these things being famous and their regular use by people. And it was true. Many of the tools are still being used, like precious stones are immersed in water before consumption.

MATERIALS AND METHODS

- The experiment was meant to confirm the efficacy of the drugs mentioned in *Sushruta samhita*. For that one drug among them was selected for experiment. *Gomeda* was selected to be subjected for experiment. Before conducting experiment the procedure to be followed was confirmed. A new experiment was designed. *Gomeda* was immersed in the water sample & the changes in water were observed.
- The time for which *Gomeda* should be immersed was unknown.
- The Weight of *Gomeda* which would be required for purification action was unknown.

- The volume of water which would get purified with certain weight of *Gomeda* was unknown.
- Suitable vessel in which purification process should be conducted was unknown.
- Possibility of the repeated use of stone to get same result was unknown.

So the experiment was designed in such a way that all these aspects are not left untouched.

Gomeda

- *Gomeda* is mentioned as Zircon in many text books of *Rasashastra*.
- According some *Rasashastra* scholars Cinnamon Stone (Hessonite) is *Gomeda*[10].
- Another gem stone considered as *Gomeda* is Alexandrite.

In this study, hessonite was used for experiment. The reasons are as follows;

- Compared to Zircon[11] and Alexandrite[12], Hessonite[13] shows more qualities of *Gomeda*.
- Zircon and Alexandrite have various types according to their colour & Alexandrite changes colour with exposure of light, which is not the quality of *Gomeda*.
- No subtypes of Hessonite according to different colours.
- Colourless Zircons are replacement to Diamonds, sold as American Diamonds.
- Alexandrite is available as Cymophane which is also known as cat's eye.
- The stones available in the market in the name of *Gomeda* are Hessonite[14].
- Availability of *Gomeda* is considered to be chiefly from Sri lakna and India but in Zircon mining Australia leads while Sri Lanka and India lead in Hessonite.
- In Tamil and Sinhalese Hessonite is known as *Gomeda*ka.
- One of the cheapest gemstone available.

Vessel-

- As the methods of purification mentioned are from *Samhita Kaala*. They must have been using earthen vessels and/or metal vessels.
- Earthen vessels were suitable for study, as the metals themselves can show some action on the impurities in the water.
- Even earthen vessel may alter the contents of water as the contents of vessels may mix with water.
- Earthen vessel was selected, as it represented the vessels used in that era.
- Glass vessel was selected as it represented inert container in comparison with the earthen vessel.

Time of immersion- Time of immersion was considered as 6 hours, 12 hours and 24 hours.

These times were to be compared with each other for efficacy. Different vessels were taken for 6 hours, 12 hours and 24 hours. To get a comparative picture, Earthen and Glass vessels were used. So 3 Earthen vessels for 6, 12, 24 hours and 3 Glass vessels for 6, 12, 24 hours were considered.

Experimental method- In experiment, the vessels were kept in normal room temperature inside building where direct sunlight or direct wind would not reach the vessels. This was done after considering the procedure to be easily acceptable in day to day life. It may not be possible to keep the vessel in direct sunlight when it is required in everyday use. Another point was that every family may not get a personal place with access to direct sunlight where they can keep the vessels for purification. Such strict rules would make *Jalaprasadana* a difficult to follow procedure in regular life. More than this many of the modern filtration methods will prove to be easily usable. Considering these factors, the experiment was conducted to get optimum effect in minimum efforts.

OBSERVATIONS AND RESULTS

After the treatment, water was analyzed for physical, chemical and microbial parameters. The readings were compared with the readings obtained from the untreated and filtered samples.

The changes in parameters are evident after the use of *Gomeda*. There is certain amount of decrease in the physical and chemical contents of the water sample. This is evident that there is action shown by *Gomeda* on water. The action was inferred by comparing the water sample treated with *Gomeda* with untreated water.

Statistical Analysis- After the application of ANOVA test and unpaired 't' test, it was found that except for few parameters, others didn't show statistically significant results. But the results were very much evident if the change in percentage was considered. The changes in the parameters are enlisted below;

CHEMICAL PARAMETERS-

Table no. 1- Showing the results of Calcium-

	24 hrs	
Glass vessel sample	=	Untreated
Earthen vessel sample	<(9.98%)	Untreated

Glass vessel sample	<(0.03%)	Filtered
Earthen vessel sample	<(12.50%)	Filtered
Earthen vessel sample	<(9.68%)	Glass vessel sample

- For better results *Gomeda* can be used in earthen vessel for 24 hours.

Table no. 2- Showing the results of Magnesium-

	6 hrs	12 hrs	
Glass vessel sample	<(37.51%)	<(37.51%)	Untreated
Earthen vessel sample	<(24.98%)	<(24.98%)	Untreated
Glass vessel sample	<(16.7%)	<(16.7%)	Filtered
Earthen vessel sample	=	=	Filtered
Earthen vessel sample	>(20.05%)	=	Glass vessel sample

- For better results *Gomeda* can be used in glass vessel for 6 or 12 hours.

Table no. 3- Showing the results of Alkalinity-

	24 hrs	
Glass vessel sample	>(13.80%)	Untreated
Earthen vessel sample	=	Untreated
Glass vessel sample	<(1.78%)	Filtered
Earthen vessel sample	<(13.70%)	Filtered
Earthen vessel sample	<(12.13%)	Glass vessel sample

- *Gomeda* used in earthen vessel for 24 hours.

Table no. 4- Showing the results of Hardness-

	24 hrs	
Glass vessel sample	<(2.57%)	Untreated
Earthen vessel sample	<(10.26%)	Untreated
Glass vessel sample	<(14.42%)	Filtered
Earthen vessel sample	<(21.17%)	Filtered
Earthen vessel sample	<(9.68%)	Glass vessel sample

- Filtered water showed increased level of hardness while *Gomeda* reduced hardness.
- For better results *Gomeda* can be used in earthen vessel for 24 hours.

PHYSICAL PARAMETERS

Table no. 5- Showing the results of Conductivity

	24 hrs	
Glass vessel sample	<(14.03%)	Untreated
Earthen vessel sample	<(9.11%)	Untreated
Glass vessel sample	<(2.75%)	Filtered
Earthen vessel sample	>(2.74%)	Filtered
Earthen vessel sample	<(5.65%)	Glass vessel sample

- For better results *Gomeda* can be used in glass vessel for 24 hours.

Table no. 6- Showing the results of pH-

	12 hrs	
Glass vessel sample	<(9.01%)	Untreated
Earthen vessel sample	<(10.39%)	Untreated
Glass vessel sample	<(4.72%)	Filtered

Earthen vessel sample	<(6.16%)	Filtered
Earthen vessel sample	<(1.51%)	Glass vessel sample

- For better results *Gomeda* can be used in earthen vessel for 12 hours.

Table no. 7- Showing the results of Dissolved Oxygen (DO)-

	6 hrs	
Glass vessel sample	>(5.09%)	Untreated
Earthen vessel sample	>(18.02%)	Untreated
Glass vessel sample	<(1.16%)	Filtered
Earthen vessel sample	>(11%)	Filtered
Earthen vessel sample	>(12.30%)	Glass vessel sample

- For better results *Gomeda* can be used in earthen vessel for 6 hours.

Table no. 8- Showing the results of Salinity-

	24 hrs	
Glass vessel sample	<(11.11%)	Untreated
Earthen vessel sample	<(90.74%)	Untreated
Glass vessel sample	<(4%)	Filtered
Earthen vessel sample	<(90%)	Filtered
Earthen vessel sample	>(89.58%)	Glass vessel sample

- For better results *Gomeda* can be used in earthen vessel for 24 hours.

Table no. 9- Showing the results of Total dissolved solids (TDS)-

	6 hrs	

Glass vessel sample	<(13%)	Untreated
Earthen vessel sample	<(15.46%)	Untreated
Glass vessel sample	>(1.77%)	Filtered
Earthen vessel sample	<(1.12%)	Filtered
Earthen vessel sample	<(2.84%)	Glass vessel sample

- For better results *Gomeda* can be used in earthen vessel for 6 hours.

Table no. 10- Showing the results of Turbidity-

	12 hrs	
Glass vessel sample	<(67.69%)	Untreated
Earthen vessel sample	<(46.15%)	Untreated
Glass vessel sample	<(4.55%)	Filtered
Earthen vessel sample	>(59.09%)	Filtered
Earthen vessel sample	>(47.62%)	Glass vessel sample

- For better results *Gomeda* can be used in glass vessel for 12 hours.

Microbial Parameters: The samples were kept for incubation for 5 days in incubator. After 5 days, increased numbers of colonies were observed. Colonies increased in number in the sample treated with *Gomeda*. But same result was observed in untreated water sample. Means *Gomeda* does not have any effect on microbial load.

DISCUSSION

The *Gomeda* used in this study was hessonite, that too of lowest cost. This kind of *Gomeda* was selected because the *Jalaprasadhana Vidhi* was expected to be cost effective for the common people. Another reason for using cheap *Gomeda* was to see the effect of lowest quality *Gomeda*. If such crystal shows some positive changes in water means the effect of higher quality of *Gomeda* can be expected to give far better results.

The shapes of different *Gomeda* used in the experiment were not exactly the same. This was not considered as standard, because small

precious stones are obtained from the chipped off pieces of larger stones. Large raw stones are cut in different angles to remove impure part from it. While cutting the raw stones one can't be sure to get exact expected shape of the crystal. That's why, even larger stones are not found to be of similar size and shape.

The unit used for precious stones is carat. One carat is approximately equal to 200 mg. Two stones of same weight have same size but shape may differ. Still generally both have same surface area. The effect depends on the area of surface that comes in contact with the liquid. So shape makes no difference if they have same surface area.

In the experiment, 1 carat of *Gomeda* was used against 1 liter of water. Means changes in water to crystal ratio can possibly give better results. Bigger size of *Gomeda* may show better results in the same amount of water.

To ensure the effect of *Gomeda* after repeated uses same *Gomeda* were used for 3 times. The effect shown by *Gomeda* after repeated use was the same as that of the first used. There were no changes observed in *Gomeda*, even in its size, shape, colour or even shine.

In future, the study can be conducted by using different sizes of *Gomeda*, or along with different other tools mentioned by *Maharshi Sushruta*.

CONCLUSION-

Gomeda shows some changes in water which are positive. It reduces magnesium, hardness, dissolved solids, turbidity, conductivity, pH, salinity; and increases dissolved oxygen. This effect varies from earthen vessel to glass vessel. But the action of *Gomeda* in producing such changes is unknown.

Explaining the effect of *Gomeda* in purification of water becomes very difficult. But we can see that *Gomeda* acts on certain parameters of water purification. We can assume that other tools mentioned by *Maharshi Sushruta* might be acting on rest of the other parameters. If used in proper combination these tools may give complete pure water. Further studies can be conducted to see the effect of those tools in water purification.

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