



UNDERSTANDING OF CONCEPT OF UDAKA IN AYURVEDA & MODERN PERSPECTIVE: A REVIEW

Babaita Sharma¹ A. K. Sonkar², Sunil Mewade³

¹Associate Professor, Dept. of Kriya Sharir, Pt. Khushilal Sharma Govt. Ayurveda College & Institute, Bhopal, MP, India

³Ex. Professor & Head, Department of Kriya Sharir, Govt Post Graduate Ayurveda College and Hospital, Varanasi (U.P.), India

³Assistant Professor, Dept. of Kriya Sharir, Pt. Shiv Shaktilal Sharma Ayurveda Medical College Ratlam (M.P.), India

Email: drbabita.sharma@rediffmail.com

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ABSTRACT

This review attempts to provide some concept about physiological aspect of *Udaka* in *Ayurveda* & its correlation with body water in modern perspective. Water is physiological basis of hydration & forms approximately 45-75% of total body weight (50-55% in female while 60- 65% in male) as total body water (TBW). Normal volume of water in body is highly essential to carry out all biological processes properly so is highly indispensable for life. In *Ayurveda* *Udaka* term is used to represent body water. Its normal quantity mentioned is ten *Anjali* measured by one's own. It does not simply represent water in the body which we intake but signifies various form of body fluids like water fraction of *Dhatus* (*Rasa, Rakta, Mamsa, Meda, Majja, Shukra*), *Upadhatus* (*Stanya* and *Vasa*) and *Malas* (*Mutra, Sweda* and *Dravyansh* of *Purish*). It can be correlated with the concept of total body water in modern physiology.

Keywords: *Udaka, Ap, Apya Dravya, Rasa, Rakta, Anjali Pramana.*

INTRODUCTION

Water is the major constituent of our body, forming approx. 60 % of our body weight¹. A man weighing about 70 kg has about 40 L total body water distributed in two compartments: Extracellular & intracellular². Proper hydration inside the body is very essential for normal functioning of the cells. That means water is a very crucial element for health & life.

Ayurveda signifies *Ap* as one of the five basic elements (*Panchmahabhuta*), forming a part of physical constitution of all living beings, performing several important actions & representing group of body fluids³. All bodily elements having predominance of *Ap Mahabhuta* are mentioned as *Apya Dravyas* eg. *Rasa, Rakta, Kleda, Vasa, Kapha, Pitta, Mutra* and *Sweda*.⁴ *Udaka* represents the physiological aspect of *Ap Mahabhuta* in the body. Unfortunately, no research work has been done to explore the concept of such an important physiological factor described in *Ayurveda* classic texts as *Udaka* so far so this is the need of hour to review the concept of *Udaka* and its physiological significance. On the other hand, in contemporary science physiological aspect of total body water including its systematic classification in different compartments like ECF and ICF is available in detail so the aim of this article is to explore the physiological aspect of *Udaka* & its modern perspective.

Review of Literature: *Ap* exhibits important attributes viz: *Rasa, Guru, Sneha, Sheeta, Drava, Manda, Mrudu, Pichchila*, & being the constitutional element of the body performs several important actions in the body like *Rasana, Snehana, Bandhana, Syandana, Kledana, Mardavata, Mraduta*, and *Hrallada* etc. representing group of body liquids⁵. The verbal meaning of *Udaka* is water / aqueous element of body⁶. In *Ayurveda* *Udaka* term is used to represent body water present in both compartments (extra and intra cellular).

It's normal quantity mentioned is ten *Anjali*.⁷ *Anjali Pramana* also known as *Kudav* or *Ardhasharava*, is a type of *Druvaya Mana*⁸, a method to measure liquid (& semiliquid) *Sharir Bhavas*⁹ filled in the bowl like shape made by joining both our palms with little fingers of both the hands in such a way that one may hold maximum volume of a liquid. It is based upon one's own *Anjali* (*Svena Anjali Pramanena*), so is very specific to a person & vary individual to individual, showing personalized approach of measurement of bodily elements & shows the measurement of *Sama Dhatu* (body tissue in physiological limit) of the individual whose *Anjali Pramana* is being measured¹⁰.

Table 1: *Anjali Pramana* of Bodily Elements According to *Charaka*⁹

S. No.	Bodily Element	<i>Anjali Pramana</i>
1.	<i>Udaka</i>	10
2.	<i>Ahararasa /Rasa</i>	09
3.	<i>Rakta / Shonita</i>	08
4.	<i>Purisha</i>	07
5.	<i>Kapha</i>	06
6.	<i>Pitta</i>	05
7.	<i>Mutra</i>	04
8.	<i>Vasa</i>	03
9.	<i>Meda</i>	02
10.	<i>Majja</i>	01
11.	<i>Shukra, Mastishka, Oja (Apara)</i>	1/2

Table 2: Anjali Pramana of Bodily Elements According to Vagbhatta ¹¹

S. No.	Bodily Element	Anjali Pramana
1.	Majja	01
2.	Meda	02
3.	Vasa	03
4.	Mutra	04
5.	Pitta	05
6.	Shleshma	06
7.	Shakrit	07
8.	Rakta	08
9.	Rasa	09
10.	Jala	10
11.	Retas , Mastishka, Oja	1/2
12.	Stanya	02
13.	Raja	04

Paniya, Salil, Neer, Kilal, Jala, Ambu, Ap, Var, Vari, Toya, Paya, Payas, Jeeravan, Ambha, Arana, Amruta and Ghanarasa are some important synonyms of UdaKa ¹².

As mentioned in Charaka Samhita, following liquid elements all together are called UdaKa¹³: when in excess excretes out as watery feces as in Atisar, which excretes out the body through urine, which is a part of Rakta Dhatu, which is present as moisture in all Dhatus like Mamsa etc., which is present all over the body specially in the outermost layer of Twacha (Avbhasini), preventing it from desiccation or as Lasika in between the seven layers of Twacha, oozing

out from Vrana in skin & is excreted out as Sweda from skin & the areas surrounding hair follicles. While describing symptoms of Atisara in Madhav Nidana, it is said that watery element of the body get increased, diminishes digestive functions and under the influence of Vata moves downward and get mixed with fecal matter in Pakwashaya producing frequent elimination of feces.¹⁴

Body Fluids are liquid part forms 2/3 part of the whole body & approx. 45-75% of total body weight. (In adult Female: 50-55% while in adult male: 60-65%) & termed as total body water (TBW).²

Table 3: Distribution of body fluids ¹⁵

Intracellular Fluid	Extracellular Fluid
It is found inside the cells.	It is found outside the cells.
It forms approx 55% of total body fluids & 40 % of total body weight. (approx.22 L of 40 L)	It forms approx 45% of total body fluids & 20% of total body weight. (approx.18 L of 40 L)

Extracellular compartment of body fluids includes:

- Blood plasma
- Lymph and interstitial fluid
- Mesenchymal tissue fluids:

a) Fluid found in bones

b) Fluid found in fibrous connective tissues

- Transcellular tissue fluids

Blood Plasma: It is the liquid part of blood. It comprises of 25% of ECF and 5% of body weight. Total

volume of blood in an average adult male is 5L and plasma is approx 3.5L.

Interstitial Fluid: It is the main component of extracellular body fluids, 12L of the 40L total body water. It forms the internal environment of the body in which cells are bathed. It fills the spaces between the cells of the body except fluid within the blood and lymph. It is formed by filtration through the blood capillaries. Its composition is almost like blood plasma, but it con-

tains less protein component as compared to blood plasma. It may also call tissue fluid, since it surrounds the cells of the tissue. It provides the medium to supply substances to the cells and removal of metabolic wastes from the cells. It also serves as a mean of communication between the cells (intra-cellular communication).

Mesenchymal (Tissue) Fluid: It is found in the tissue originated from mesenchyma and forms about 6% of total body water (TBW).

Transcellular Fluid: It forms the smallest part of ECF compartment (1.5%) of total body water and presents between epithelial lined spaces. It is separated from other compartments of ECF by cell membranes (cellular barriers) and is formed from transport activities of the cells like secretion of secretory and granular cells, e.g. cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, synovial fluid, intra-ocular fluid, lacrimal fluid, luminal fluids of gut, thyroid and chochlea & fluid in urinary tract etc.¹⁵

Material and Method

All available relevant texts and authentic publications from *Ayurveda* as well as contemporary literature has been compiled and analyzed thoroughly to review the physiological concept of *Udaka* & its correlation in modern perspective.

DISCUSSION

Udaka is a specific term used to denote body water in *Ayurveda*. It is an important and major constituent, representing *Ap Mahabhuta* in the body, exhibiting properties like cohesion and viscosity, which make it capable to bind things together and to keep them moving as owing the attributes like *Sara*, *Drava*, *Chala*, *Snigdha*, *Pichhila*⁵. Also, it serves as the unique solvent capable of dissolving most of the biomolecules.

Normal volume of water in body is highly essential to carry out all biological processes properly so is highly indispensable for life.

Charaka presented a unique concept of normal volume of liquid and non liquid bodily elements (*Udaka*, *Rasa*, *Rakta*, *Purisha*, *Kapha*, *Pitta*, *Mutra*, *Meda*, *Majja*, *Vasa* and *Shukra* etc.) in *Anjali Pramana*, showing interrelation among them & described the *Anjali Pramana* of *Udaka* vary first, showing it as the most important and the most abundant constituent of the body with ten *Anjali* in volume. It can be correlated with the concept of total body water in modern physiology. Next comes *Rasa Dhatu*, which is freely circulating body fluid with nine *Anjali* in quantity, then comes *Rakta*, which is again a liquid *Dhatu*, derived from *Rasa* and confined to its channels, *Dhamani* only and does not come out of it. Its normal volume is eight *Anjali*. Both are liquid *Dhatus* having predominance of *Ap Mahabhuta*, but *Rasa* has predominance of *Ap Mahabhuta* only while *Rakta* has dominance of *Ap* and *Tej* both that means *Apya* portion of *Rasa Dhatu* has more *Ap* while *Apya* portion of *Rakta* has *Ap* with *Tej* also.¹⁶

Udaka is not simply represents water in the body which we intake but signifies various form of body fluids like water fraction of *Dhatus* (*Rasa*, *Rakta*, *Mamsa*, *Meda*, *Majja*, *Shukra*), *Upadhatus* (*Stanya* and *Vasa*) and *Malas* (*Mutra*, *Sweda* and *Dravyansh* of *Purish*), which vary from each other owing to their specific solute composition depending upon the part or organ of the body which contain it, attributing them specificity in their properties & functions. But one thing is common in all that water/*Udaka* is serving as the liquid medium in all of them. Finally, the term *Udaka* signifies the liquid fraction of all *Jaliya/Apya* elements of the body:

Table 4: *Apya* Bodily Elements

S.No.	<i>Apya Dravyas</i>	<i>Apya Bodily Elements</i>
1.	<i>Apya Dhatu</i>	<i>Rasa, Rakta, Meda, Majja</i> and <i>Shukra</i>
2.	<i>Apya Upadhatu</i>	<i>Stanya, Vasa</i>
3.	<i>Apya Mala</i>	<i>Kapha, Pitta, Mutra, Sweda</i>
4.	Other <i>Apya Dravya</i>	<i>kleda, Lasika, Rakta Rasa,</i>

Anguli & Anjali Mana are described to measure *Sharira Bhavas*, *Anjali Pramana* is used to measure liquid body tissues so belongs to *Dravaya* mean of measurement⁸. & it is stated that measure should be taken as one's own *Anjali (Svena Anjali Pramanena)*⁹, which shows that quantity of *Udaka* varies with indi-

vidual to individual so is very personalized & individualistic¹⁶. In classical texts of *Ayurveda* several methods of measurement of ancient time are described. One of these methods is based on geographical regions of that time including two-way measurements viz: *Magadha & Kalinga Mana*.

Table 5: Comparison between *Anjali Pramana* by *Magadha & Kalinga Mana* ¹⁷

<i>Magadha Mana</i>	<i>Kalinga Mana</i>
One <i>Kudav</i> equals to one <i>Anjali</i>	One <i>Kudav</i> equals to two <i>Prastri</i> equals to two <i>Prastri</i> equals to two <i>Pala</i>

It can be concluded that one *Anjali* measurement is taken equivalent to one *Kudav* (four *Pala*)¹⁸.

Furthermore, it is mentioned that this measurement is prescribed for dry *Aushadh Dravyas* only. For measuring liquid substances, it is advised to consider the measurement just double to that of dry ones ¹⁹. (4 *Pala* = 1 *Kudav* or *Anjali* while for liquid it is taken just double that means one *Anjali* may be equal to 8 *Pala*). One *Anjali /Kudav* equals to four *Pala* equal to approx.192 gms ¹⁷.

Sharangdhara has defined *Kudav* measurement equals to a volume of liquid filled in a cylindrical cup shaped pot of mud, wood or metal of 4 *Angul* in length, width and height each ²⁰.

Here one *Angul* equals to 6.17 cm approx. so one *Kudav* equals to $6.17^3 = 235\text{cm}^3$, it means volume of a pot with 1 *Kudav* measurement should be 235 cm^3 which may contain approx.400-500 ml of non liquid and 800 - 1000 ml. of liquid substances. In this way 10 *Anjali Udaka* may equals to 10L.²¹

Also, it has been mentioned that the volume of bodily elements regularly varies in physiological limits showing unstability in their measurements ²² as well as with changing eras due to changes in the size of body & body parts so cannot be measure accurately.²³

As in modern concept all body fluids are predominantly comprised of water as the major constituent eg. blood has 55% while plasma and lymph contain 99% water in their composition². Although in our classical texts, no any similar thought of measurement of water content in composition of a particular *Apya Dravya* has not been observed, but it is assumed that when *Anjali* measurements of all *Apya Dravyas* of the body

are taken in consideration and sum up, the total measurement of *Udaka* might be near to the measurement given in modern physiology that is 40 L. moreover, it's very difficult to assess the accurate volume of *Udaka* in the body in the review study so it is further recommended to carry our any observational study to assess the measurement of *Udaka* in the body to justify its comparison with body water and body fluids in modern perspective.

CONCLUSION

Udaka is a specific term used to denote body water in *Ayurveda*. It is an important and major constituent, representing *Ap Mahabhuta* in the body & includes various form of body fluids like water fraction of *Dhatus (Rasa, Rakta, Mamsa, Meda, Majja, Shukra)*, *Upadhatus (Stanya and Vasa)* and *Malas (Mutra, Sweda and Dravyansh of Purisha)*. These *Apya Dravyas* vary from each other owing to their specific solute composition, which make them specific in their properties and capable of performing their respective functions also but one thing is common in all, that water/*Udaka* serves as the liquid medium in all of them & can be correlated with the concept of total body water in modern physiology.

Rasa serves as the liquid *Dhatu* of the body, differentiate from *Udaka* as having various dissolved nutrients. Its *Poshak* part serves as fluid medium of circulation and provides fluidity to circulating *Rakta* also. Along with *Rakta & Lasika*, it may resemble ECF (extra cellular fluid) including blood plasma, lymph and interstitial fluid while *Poshya Rasa Dhatu* may correspond with intracellular & tissue fluid (ECF). *Kleda*

signifies internal body moisture required for smooth functioning of the *Dhatus* but when in excess serves as *Dushya* in pathogenesis of various disorders.

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