



COMPARATIVE PHYSICO-CHEMICAL STUDY OF *ARJUNA KWATHA* PREPARED BY USING TWO DIFFERENT PROPORTION OF WATER

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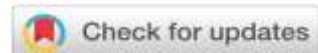
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ABSTRACT

Objectives: In order to observe the difference in physicochemical parameters of *Kwatha* (Decoction) prepared by using two different proportion of water. The study was conducted by using *Arjuna* as a *Kwatha* drug. **Methods:** Conventional method using 16 parts and 8 parts of water *Arjuna Kwatha* was prepared and reduced to 1/8th and 1/4th respectively. Total fuel and time required for this were noted. Physicochemical parameters such as pH value, Refractive index, specific gravity and total solid contents were compared. **Result and Conclusion:** It was observed that there is not notable difference in both samples of *Arjuna Kwatha* except total solid content which was higher in 8 parts water used *Kwatha*. Hence it can be suggested that *Arjuna* is Madhyam consistency drug and needs 8 parts of water to prepare its *Kwatha* which also save fuel and time.

Keywords: Kwatha, Arjuna, Total solids, Madhyam

INTRODUCTION

Kwatha Kalpana (Decoction) is the most important dosage form of *Bhaishajya Kalpana* as it is widely used for therapeutic as well as for the preparation of various secondary dosage forms. Quality of any

formulations depends upon its source preparations hence quality of *Kwatha Kalpana* need to assure for maximum therapeutic potential. Regarding pharmaceutical preparation of *Kwatha Kalpana*, there are

different opinions about proportion of water to be added. Some ancient seers recommended addition of 16 part of water and reduced up to 1/8th of its initial volume¹⁻² whereas some recommended 8 or 4 part of water and reduction up to 1/4th.³⁻⁴ It was also mentioned use of 8 or 16 part of water and reduction up to 1/4th.⁵ Hence there is ambiguity regarding addition of water and reduction volume although it was suggested as per the context of consistency and weight of raw drug, therapeutic use etc. So, it was quite difficult for the manufacturer especially at industrial level that how much water should be added for getting optimum quality. While the water was added as per consistency also such as *Mridu*(Soft),*Madhyama*(Medium consistency), and *Kathina*(Hard consistency)⁶ but very few drugs have been categorised in this context. In this regard, the study was conducted which was aimed to compare the quality of *Kwatha* on the basis of physicochemical parameters by using two different proportion of water. For this purpose, *Arjuna* (*Terminalia arjuna* W. & A) was selected. *Arjuna* is well-known drug and has been widely used for therapeutic purposes in Ayurveda in various forms such as *Kshirpaka*(Medicated Milk), *Siddha Gruta*(Medicated ghee), *Arishta*(Alcoholic fermentation) etc. *Kwatha* of *Arjuna* is the base of these formulations. It is indicated in *Medoroga*(Obesity),*Vrana*(Wounds),*Hridroga* (Heart Diseases), *Kshatashaya*(Debility), *Prameha* (Diabetes mellitus), *Vyanga* (Chloasma) etc.⁷ *Arjuna* bark is

used for the medicinal purpose. In this study, *Arjuna Kwatha* was prepared by using eight and sixteen parts of water and reduced to 1/4th and 1/8th respectively. To clear the ambiguity regarding consistency of *Arjuna* and to save fuel and time the study was carried out.

Methods and Materials

Materials

Apparatus used for Kwatha preparation.

Vessel used for *Kwatha* was of stainless-steel having capacity of 5 lit (Length – 20cm: Depth -20 cm: Diameter -18cm), Stirrer (Length-34 cm: Breadth:7.5cm), Metal scale (steel body), Cotton cloth (15X 15 inch (1.3ft)), LPG gas (Commercial LPG at 2.92kN/m² (30gf/cm²) having capacity of fuel consumption of 189g/h,(2064 kcal/h), Measuring Jar, and weight machine.

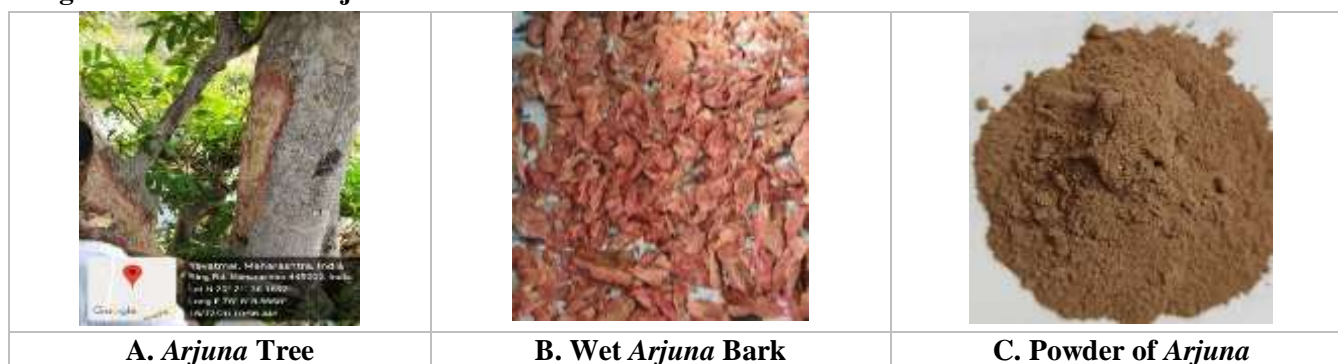
Collection and Authentication of Arjuna

Arjuna stem was collected from territory of Yavatmal region in the month of December (Lat N20°21'36.1692", Long E 78°8; 8.5668") It was allowed to shade dried. It was authenticated and certified by Botanical survey of India (BSI) Pune, Maharashtra.

Water for Kwatha

Laboratory graded Distilled water were taken for *Kwatha* purpose.

Images 1: Self collected Arjuna Bark



Components of Kwatha

- 1) *Arjuna* Bark Powder (100 mesh): 250gm
- 2) Distilled water for *Kalka*: 500ml.

- 3) Distilled water for *Kwatha*: 4000ml (16 parts)/2000ml (8 parts)

METHODS

Organoleptic study of raw drugs

Organoleptic study is the first criteria for identification of any drug, so *Arjuna* was identified with five sense organs and confirmed its original identity.

Powder (Churna) Preparation of Arjuna

Well dried *Arjuna* bark was pulverized to fine powder. It was then sifted with mesh size# 100.

Kwatha was codified as AC1 for conventional method where 16 parts water was used and AC2 for the method where 8 parts of water was used.

Preparation of Arjuna Kwatha (AC1)

Powdered *Arjuna*(250G) was taken into bowl and *Kalka* was prepared using distilled water(500ml). *Arjuna Kalka* was then taken into *Kwatha* vessel and water was added which is to be reduced 1/8(500ml) Level was measured with metal scale(5cm) and remaining

water (3500) was added then. Mixture was stirred properly and kept on fire at low flame. Temperature was measured every one hour. *Kwatha* was stirred at regular interval. Boiling was stopped when required level was achieved. *Kwatha* was filtrated through cotton cloth. The filtrate was then bottled in PET bottles.

Preparation of Arjuna Kwatha (AC2): Same procedure was repeated by using 8 part of water(2000ml) and 1/4th reduction.

Physicochemical analysis of Arjuna Kwatha

pH Value estimation⁸, Determination of Specific gravity⁹, Determination of Refractive Index¹⁰, Determination of Total Soluble Solids¹¹ of prepared *Arjuna Kwatha* were done as per the standard procedures of Ayurvedic pharmacopeia of India.

OBSERVATION AND RESULT

Table 1: Organoleptic Characteristics of Arjuna bark

Shabda (Sound)	Sparsha (Touch)	Rupa (Appearance)	Rasa (Taste)	Gandha (Smell)
Non-Specific	Dry and rough	Pinkish light brown	<i>Kashaya Tikta</i>	Specific

Table 2: Observations of Arjuna Kwatha by AC1

Time	Time in minutes	Temp in degree C	Observations during kwath process
3.00pm	00	30°C	Thick White Form with brown tint throughout outer surface was seen
4.00pm	60	60°C	Foam started releasing with initiation of boiling
5.00pm	120	95°C	Foam was getting faded with brown color
6.00pm	180	100°C	<i>Kwatha</i> Started concentrating further
7.00 pm	240	100°C	Started solidifying with brown color +
8.00pm	300	100°C	Started solidifying with brown color + +
9.00pm	360	100°C	Started solidifying with brown color + + +
10.00pm	420	100°C	Solidifying with more dense Brown color + + +
11.00pm	480	100°C	Concentrated brown color with brownish foam
11.30pm	510	100°C	Concentrated dark brown little semisolid liquid

Images 2: Steps of Arjuna Kwatha prepared by AC1.



Table 3: Observations of Arjuna kwatha(AC2)

Time	Time in minutes	Temp in degree Celsius	Observations during Kwatha process
11.30am	00	30°C	Thick White Form with brown tint on surface
12.00 pm	30	60°C	Thick foaming over surface
12.30pm	60	76°C	Thick foaming with mild boiling initiated
1.00pm	90	80°C	Boiling initiated
1.30pm	120	95°C	Foam was separated at surfaces
2.00pm	150	96°C	Foam was separated at surfaces
2.30pm	180	100°C	Active boiling with mild foaming
3.00 pm	210	100°C	Active boiling with marked concentrats
3.30pm	240	100°C	Sticking at bottom started Level achieved

Images 3: Steps of Arjuna Kwatha (AC2)



Table 4. Time and Fuel required for Arjuna Kwatha

Sr.no	Sample Name	Quantity Of Kalka(gm)	Quantity of Wa-ter(ml)	Total time in minutes	Total fuel Used (in gms)
1	AC1	250	4000	510	1606.5
2	AC2	250	2000	240	693

Table 5. Organoleptic Characteristics of Arjuna Kwatha

Sr.no	sample Name	Shabda	Sparsha	Rupa	Rasa	Gandha
1	AC1	NS	Drava	Dark brown	Kashaya(Pungent)	Specific
2	AC2	NS	Drava	Dark brown	Kashaya(Pungent)	Specific

Table 6. Physicochemical parameters of Arjuna Kwatha

Sr. No.	Sample Name	pH	Specific Gravity	Refractive Index	Total Solid Content (%)
1	AC1	4.77	1.025	1.349	5.90
2	AC2	4.90	1.026	1.349	6.16

DISCUSSION

Conventional methods of *Kwatha* preparation suggests addition of sixteen part of water and reduced to 1/8th. Also, addition of eight part of water and reduction up to 1/4th is considered as per the need. use of water as per the consistency and quantity of drugs, states the importance regarding the optimization of quality of *Kwatha Kalpana*. Reduction volume as per the therapeutic use of *Kwatha* is also categorized by Harita which is sufficient to understand the ancient wisdom.¹² In spite of various specification of *Kwatha* by most of the Acharyas, there are many challenges in terms of Particle size, consistency of drugs, Vessel to be used, Temperature, water to be added etc. which directly affects its processing cost and optimum quality. Hence there need to optimize the process by studying on various factors which validate the procedure. So, the study was focused to validate the consistency of *Arjuna*. Although, coarse powder is taken for *Kwatha Kalpana*, but this study used fine powder (100 mesh) for *Kwatha* preparation in order to save fuel and to follow the principle of particle size. As particle size reduces surface area increases which initiates more solubility of solutes in the solution.

In this study, *Kwatha* was prepared using two different proportion of water i.e. 16 parts (AC1) and 8 parts (AC2). There needs about 500ml.of water for Kalka preparation of 250gm powder of *Arjuna*. Foaming was more initially and disappears with successive boiling. Assay for Foaming index for presence of saponin could be studied in *Arjuna*. In AC1 group, it required 510 mints and 1606 Gm. fuel, whereas 240 mints and 693Gm fuel for AC2 group. So, conventional technique AC1 was more time and fuel consuming as compared to AC2.It was almost 75% more fuel and double time were required for AC1 technique than AC2.

In organoleptic study, specific *Arjuna* smell was observed. Color of *Kwatha* was brown to dark brown. *Arjuna* has typical *Kashaya* (Pungent)Taste which was specific to both of *Kwatha*.

In Physicochemical properties, *Arjuna Kwatha*, AC2 showed higher pH value as compared to AC1 whereas other parameters refractive index and specific gravity have not shown any major difference. However, the

percentage of total solid contents(TSC) was more in AC2 than the AC1 So, in spite of less proportion of water used, TSC was more. This shows 8parts water used *Kwatha* is more promising as compared to 16 parts of water which needs more fuel and time duration.

CONCLUSION

In pharmaceutical study, time duration and fuel required for *Arjuna Kwatha* used eight parts of water was less as compared to sixteen parts of water used *Kwatha*. Physicochemical parameters such as pH value, Specific gravity, Refractive index and Total solid contents were more promising in eight parts used *Kwatha* as compared sixteen parts used *Kwatha*. So, it can be suggested that *Arjuna Kwatha* should be prepared by using eight parts of water to save fuel and time and *Arjuna* can also be considered as medium type of drug. Further, other sophisticated analytical techniques need to be carried out to validate the study.

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