WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 9, 1074-1081. Research Article ISSN 2277–7105

A COMPARATIVE PHARMACEUTICAL STUDY OF *YAKRIT PIPPALI* USING TWO METHODS: TRADITIONAL *PUTA* METHOD AND MUFFLE FURNACE METHOD

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Article Received on
06 March 2024,

Revised on 27 March 2024,
Accepted on 17 April 2024

DOI: 10.20959/wjpr20249-32043

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ABSTRACT

Yakrit Pippali is a formulation explained in the *Sushruta Samhita, Uttara Tantra, Drishtigataroga pratishedhadhyaya* (17th chapter) in the context of *Naktandhya*.[1] Hence an attempt was made to prepare *Yakrit Pippali* using traditional *Puta paka* method (Batch 1) and Muffle furnace method (Batch 2). In both the methods, *Pippali* was pierced into the *Aja Yakrit* and heating was given which would ensure uniform heat distribution. *Puta Paka* method was carried out using *Laghu Puta* with 50 coconut shells and heated for 40 minutes. The temperature was maintained up to 300-350^{0}C. *Yakrit pippali* was prepared in Muffle furnace with *Kramagni Paka* i.e gradual temperature pattern was followed up to 300^{0}C. In both of these methods, there were considerable amounts of loss seen, i.e. 41.6% in Puta Paka method and 61% in Muffle furnace method. Loss of product was more in Batch 2 compared to Batch 1. The final product obtained was fried in an iron pan for 5 minutes for removing moisture and later stored in a glass container. Mouth of the container was closed by aluminium foil and stored properly.

KEYWORDS: *Yakrit Pippali*, *Puta Paka* method, Muffle furnace method, Vitamin A, Liver diseases.

INTRODUCTION

"मांसेनोपचिताङ्गानां मांसं मांसकरं परम्"[2] said in *Charaka Samhita* in the context of *Rajayakshma*. It means that when *Mamsa* gets depleted in the patient, then one must consume *Mamsa* of other sources like animals to replenish the losses. Similarly, any disease related to *Yakrit* can be treated by formulations that are prepared using *Yakrit* of other sources. Puta is traditional method of preparation, but as science advanced modern equipment have come up like Electric Muffle furnace. Hence an attempt was made to prepare *Yakrit Pippali* using *Puta paka* method and Muffle furnace method and compare the final products of both methods.

MATERIALS AND METHODS

AIM: To do pharmaceutical study of *Yakrit Pippali* using *Puta Paka* method and Muffle furnace method.

OBJECTIVES

- To compare the pharmaceutical study of *Yakrit Pippali* prepared using *Puta Paka* method and Muffle furnace method.
- To compare the organoleptic characters of *Yakrit Pippali* prepared by both methods.

MATERIALS: Weighing machine, Steel plates, Kora cloth, Multani mud, Banana leaves, Coconutshells, Blower, Muffle furnace, *Sharava*.

Table 1: Formulation Ingredients and Parts used.

Sl. No.	Drug used	Botanical name/ Scientific name	Parts used
1	*Aja Yakrit* (Goat's liver)	*Capra aegagrus hircus*	Liver
2	*Pippali*	*Piper longum* Linn.	Fruit

Table 2: Properties of Ingredients.

Drug used	***Aja Yakrit* (Goat's liver)**	***Pippali***
Rasa	*Madhura*	*Katu*
Guna	*Natisheeta, Adahi, Laghu, Snigdha*	*Laghu, Teekshna*
Veerya	*Asheetoshna*	*Ushna*
Vipaka	*Madhura*	*Madhura*
Chemical constituents	Vitamin A, Vitamin B12, Zinc, Iron, Copper, Riboflavin.	Caryophylline, Piperine, Piperlogumine, Pipercide, Sesamine
Doshagnata	*Tridoshahara*	*Vatakaphahara*
Karma	*Laghu, Snigdha, Madhura Vipaka Tridoshahara, Balakara, brimhana, Ruchya, Balakara, Brimhana, Ruchya, Hridya, Veeryavardhana*[3]	*Ushna Veerya, Laghu, Teekshna, Madhura Vipaka, Rasayana, Vrushya, Udaragulmahara, Vrushya, Deepana, Shwasakasahara, Ama pachaka*[4]

Methods of preparation

Aja Yakrit was purchased from a local mutton shop in Moodabidri which was of good quality and procured from the goat that was killed less than 24 hours back. *Pippali* was procured from the Raw Drug Storage, Alva's Pharmacy, Moodabidri which was authenticated, quality tested and used.

Yakrit Pippali was prepared in 2 batches by changing the method of preparation i.e Traditional *Puta* method and Muffle furnace Method.

Purva Karma

In both Batch 1 and 2, the *Aja yakrit* was washed thoroughly with 1 litre of RO purified water mixed with 50g each of turmeric and salt. Parts like ligaments, muscles, arteries/veins, fasciae, Glisson's capsule were removed. *Yakrit* was pierced with *Pippali* over one surface in such a way that it should come out in the opposite surface. Weight of yakrut was noted before and after piercing with pippali.

Pradhana Karma

Batch 1: *Yakrit* which was pierced with *Pippali* was covered with Banana Leaves and tied with thread. Later it was covered with 3 layers of Kora cloth smeared with Multani mud and kept under sunlight for drying. Once the prepared samputa was completely dried, it was subjected to *Laghu Puta* by covering the *Samputa* with 50 dried coconut shells. Thus, prepared *laghu puta* was ignited with fire. Heating was continued for 1 hour and later the prepared samputa was removed from *Puta* and left as it is for *Swanga sheeta* for 1 night.

Batch 2: *Yakrit* pierced with *Pippali* was placed over a *Sharava* and it was covered with another *Sharava* and *Sandhi Bandhana* was done using 3 layers of Kora cloth smeared with Multani mud and kept under sunlight for drying. *Sharava Samputa* was placed inside muffle furnace and heating done till 300^0C and temperature reduced gradually. After heating was stopped, it was left as it is for *Swanga Sheeta* for 1 night.

Table 3: *Kramagni* method of changing temperature. (Batch 2).

TIME	TEMPERATURE	TIME	TEMPERATURE
12:30 PM	100^oC	3:00 PM	300^oC
01:00 PM	200^oC	3:30 PM	200^oC
01:30 PM	300^oC	4:30 PM	100^oC

Pashchat Karma

In both Batch 1 and 2, next day morning, burnt Samputa was taken out of puta and its outer covering was removed carefully without mixing them with the inner contents. The burnt *Yakrit pippali* was taken out and pounded to form coarse powder. *Yakrit Pippali* was heated in a steel vessel for 5 minutes before storing. The obtained final product was weighed and stored in an air-tight glass container. *Yakrit Pippali* was stored in a pre-heated sterilized glass container. The glass container was sealed air-tight using aluminium foil and closed by tying a thread around the foil.

OBSERVATIONS

Table 4: Comparison between the observations in Batch 1 and Batch 2.

BATCH – 1 (Traditional *Puta Paka* method)	
Time Duration of Puta	1 hour
Time for Swanga Sheeta	1 night
Results:	
Total time taken	1 day
Quantity taken	580g (*Yakrit*) + 150g (*Pippali*)
Quantity obtained	390g
Loss	304g (41.6% loss)

BATCH – 2 (Muffle furnace method)	
Time Duration of heating	1.5 hours
Time for Swanga Sheeta	1 night
Results:	
Total time taken	1 day
Quantity taken	511g (*Yakrit*) + 99g (*Pippali*)
Quantity obtained	232g
Loss	378g (62% loss)

Organoleptic characteristics

Table 5: Comparison between the organoleptic characters of Batch 1 and Batch 2.

Batch 1 (Traditional *Puta Paka* method)	**Batch 2 (Muffle furnace method)**
Colour: Brownish black	**Colour:** Brownish black
Consistency: Soft, less brittle	**Consistency:** Brittle
Taste: *Katu, Kashaya*	**Taste:** *Katu, Kashaya*
Odour: pungent smell	**Odour:** pungent smell
Touch: soft	**Touch:** coarse

Parameters

- **Dose:** 1 *Karsha (12g)* to be taken in divided doses twice/thrice per day
- **Indication:** *Naktandhya, Kaphapittaja Vyadhi*, Liver disorders
- **Anupana:** Honey, Water, *Triphala*
- **Shelf life:** 3 months
- **Route of administration:** internal, externally as *Anjana*

Photographs showing the preparation of Yakrit Pippali are shown below.

Batch 1.

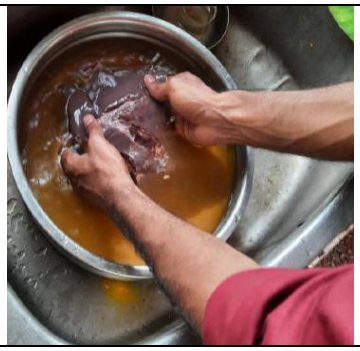

Fig 1: Cleaning *Yakrit* with water mixed with turmeric and salt.

Fig 2: *Yakrit* and *Pippali.*

Fig 3: *Yakrit* pierced with *Pippali.*

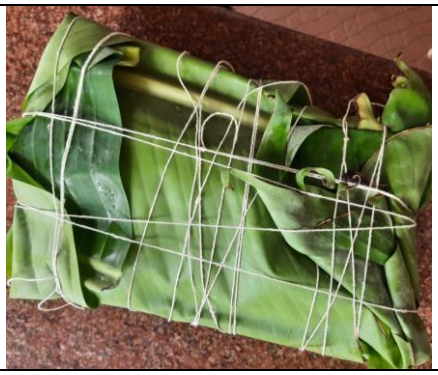

Fig 4: Covering *Yakrit Pippali* with banana leaves

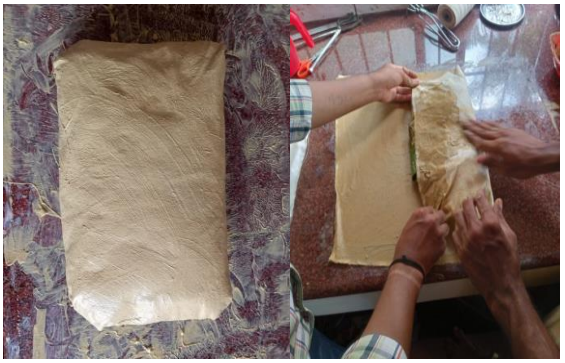

Fig 5: *Sandhi bandhana* of *Yakrit Pippali* with Kora cloth and Multani mud.

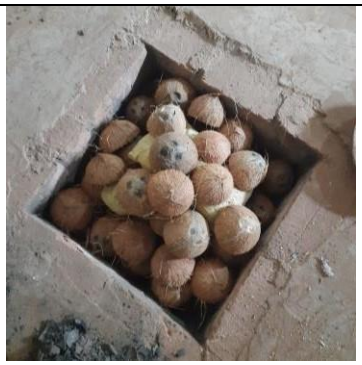

Fig 6: *Laghu Puta* given for *Yakrit Pippali by adding* with dried coconut shells.

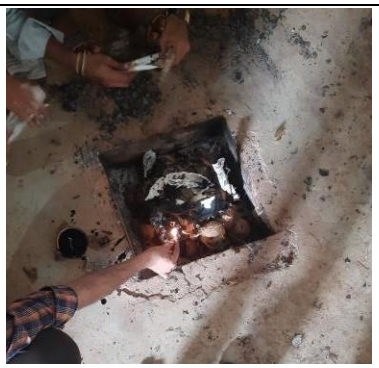

Fig 7: Igniting *Yakrit Pippali* in *Laghu Puta*

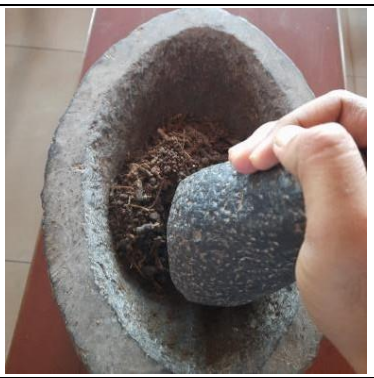

Fig 8: *Yakrit Pippali* pounded into course powder.

Fig 9. Final product of *Yakrit Pippali.*

Batch 2.

Fig 10: *Yakrit* pierced with *Pippali.*

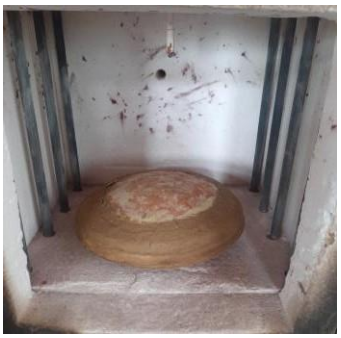

Fig 11: *Sharava Samputa*

Fig 12. Burnt *Yakrit Pippali*

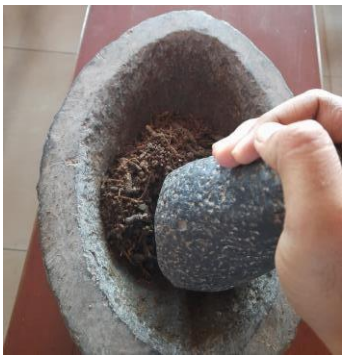

Fig 13: *Yakrit Pippali* pounded into powder.

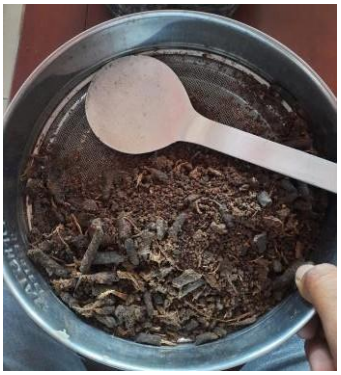

Fig 14: Sieving after pounding

Fig 15. Fine powder of *Yakrit Pippali*

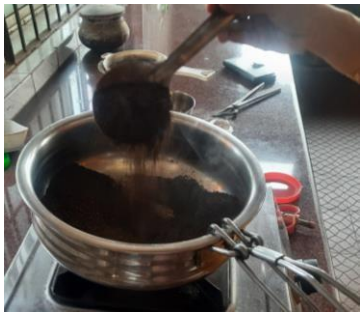

Fig 16: Heating *Yakrit Pippali* before storing.

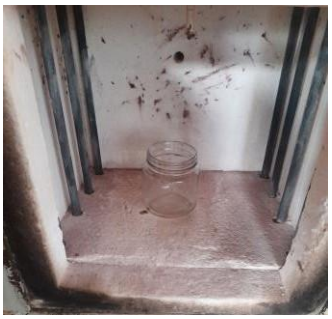

Fig 17: Heating glass container before storing

Fig 18: Final product.

RESULTS

In both of these methods, there were considerable amounts of loss seen, i.e. 41.6% in Puta Paka method and 61% in Muffle furnace method. Loss of product was more in Batch 2 compared to Batch 1.

DISCUSSION

- *Yakrit Pippali* is a unique preparation mentioned in *Sushruta Samhita.* The *Aja Yakrit* is superior among other *Yakrit* due to its easy availability and properties. The histological structure of the liver among human, cow, sheep and goat was found to be almost similar.[5]

- The *Pippali* mentioned here should be selected that are strong and long so as to penetrate the length of the *Yakrit.*
- During *Puta,* 3/4th quantity of coconut shells were placed as a base. The *Samputa* containing *Yakrit* and *Pippali was kept* and above that rest of the coconut shells were placed. Cow dung cakes can also be used instead of coconut shells.
- *Laghu Puta* was used as the ingredients used were soft in nature and excessive heat may lead to converting it into ash and increased loss.
- Loss of product was more in Batch 2 compared to Batch 1. May be because more heating was done in Batch 2 with *Kramagni* method that led to more loss of moisture compared to batch 1.
- *Aja Yakrit* is rich in essential amino acids and vitamin A, B12 etc.[6] Hence it acts as a remedy for protein deficiency, skin health and deficiency of vitamin A that leads to conditions such as Night Blindness, scaling of skin.
- As it is rich in Vitamin B12 it enhances cell divisions and generation of ATP and faster metabolism of carbohydrates and fat. This will in turn help in regeneration of damaged/injured hepatocytes of the liver in chronic liver fibrosis and liver cirrhosis.
- Stellate cells which form 5% of the liver tissue and a reservoir of vitamin A. It is activated during liver injury and converts into myofibroblast - like morphology. Myofibroblast produces collagen fibres and proteoglycans leading to hepatic fibrosis.[7] This activation process is also associated with loss of vitamin A storage. *Aja Yakrit* is a rich source of vitamin A, hence to compensate the loss, *Aja Yakrit* can be given as a remedy.
- *Pippali* contains piperine which acts as a bio-enhancer[8] and stimulates absorption by stimulating gut amino acid transporters. It also inhibits cell pump responsible for drug elimination and hence produces maximum action. *Pippali* also have anti-inflammatory, anti-oxidant action and may help in the regeneration of liver tissue and improvement of immune system there by reducing infections.
- *Yakrit Pippali* was stored in the glass container as glass is the least reactive material with the animal proteins present in the product.
- Hence both *Aja Yakrit* and *Pippali* may have hepato-protective action and may help inthe improvement of liver function.

CONCLUSION

Yakrit Pippali can be prepared using *Puta Paka* method and Muffle furnace method which can be administered to patients with suitable *Anupana* and *Aushadha Sevana Kala* in conditions like hepatic disorders (*Yakridvikara*), night blindness (*Naktandhya*). Muffle furnace method was better compared to Traditional *Puta* method.

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