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## Validation of rasapanchaka of varieties of buttermilk (Takrabhedas) mentioned in Bhavaprakasha

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**Abstract**

Takra is having a significant role in the history of Indian population in social, religious and cultural aspects since *Vedic* times. Takra is the one of the major probiotics in *Ayurveda*, which is having main action on improving the digestive and metabolic capacities. The concept of classification of Takra based on dilution factor is unique to *Ayurveda*. But even though a number of studies have been conducted in buttermilk no researches have been conducted in the concept of Takrabhedās. Even though *Acharya Bhāvaprakāśa* mentioned five different varieties of *takrabhedas* based on dilution factor, there is a lacuna in description regarding *rasapanchaka* of each variety of *Takra*. The present study validates the *rasapanchaka* of the *takrabhedas* explained in the *Bhāvaprakāśa* with the aid of physicochemical parameters.

**Materials and Methodology:** Total 5 samples of takra were taken for the study, which includes *Ghōlam*, *Mathitam*, *Takram*, *Udaśvit* and *Caccika*. Physical analysis includes *rūpa*, *rasa*, *gandha*, *sparsaparīkṣa*. Biochemical analysis was done for pH, Titratable acidity, Specific gravity, Moisture, Total Solids, as per the standard procedure available. The assessment criteria was based on one way ANOVA followed by Turkey Kramer test as post Hoc with a level of significance of  $P < 0.05$  using SPSS 16.0 software.

**Result:** The study shows the variation in the *rasapanchaka* among the different varieties of *Takra*.

**Keywords:** Takrabhedās, rasapanchaka

**Introduction**

In *Ayurveda*, takra is considered under a varga which itself is named Takravarga which is under Drava Dravya group of āhārakalpana [1]. In *Bhāvaprakāśa* [2], *Yōgaratnākara* [3] etc. relevance of Takra is highlighted. Numbers of indications are attributed to Takra in *Samhitas* and *Nighaṇḍus*. The concept of classification of Takra based on dilution factor is unique to *Ayurveda*. It is interesting to note that, the indication of Takrabhedās varies with dilution factor. But in literatures, there is a lacuna in description regarding *guṇa* of each variety of Takra. In *Bhōjanakutūhala* [4] its indication is not only limited to āmaśaya but extended to broad spectrum which includes prameham, vṛṇagna etc. Number of researches in this area is limited. It's the need of the hour to validate the Takrabhedās explained by our acharyas. The present study validates the *rasapanchaka* of the Takrabhedās explained in the *Bhāvaprakāśa* [5] with the aid of physicochemical parameters.

**Table 1:** Rasapanchaka of takrabhedas mentioned in *Bhāvaprakāśa*

Takrabhedas	Rasa	Guna	Veerya	Vipaka
Ghōlam	-	-	-	-
Mathitam	-	-	-	-
Takram	Kashaya, Amla	Laghu	Ushna	Madhura
Udaswith	-	-	-	-
Caccika	Lavana	Sita, Laghu	-	-

\* In *Bhāvaprakāśa* nighandu mentioning of rasa pancaka is limited to Takra and Caccika variety of Takrabhedas.

**Materials and Methodology****Standardisation of Procedure for Preparation of Takrabhedas**

- Collection of milk
- Standardization of the procedure for the preparation of the *Takrabhedās*.

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**a) Collection of milk**

The milk used for the preparation of the *Takrabhedās* was procured from the Safa Farm, Chudalapaara, and Kottakkal. One cow was selected and milk was collected from the farm every day at same time (3 pm) and it was boiled in vessels by keeping it over water in a sterilizer and was allowed to cool down to 37° C. At that particular temperature the milk was inoculated with the 5 ml of lactobacillus acidophilus and 5 ml of yogurt culture for 1000 ml of milk. It was stirred well and kept for 15 hours and pH of the buttermilk was continuously observed with pH meter and when the pH became 4.5, the curd obtained was taken and churned using Mathana Yantra. The churning time was standardized as 30 minutes, (as after 30 minutes of churning when buttermilk samples were analysed for fat content it was nearly 0.1-0.2%).

**Ghōla:** churned for 30 minutes without addition of water and butter was not removed.

**Mathita:** churned for 30 minutes without the addition of water and removed the butter.

**Takra:** churned for 30 minutes by adding 25 ml of water for 100 ml of curd and removed the butter.

**Udaśvit:** churned for 30 minutes by adding 50 ml of water for 100 ml of curd and removed the butter.

**Caccika:** churned for 30 minutes by adding 100 ml of water for 100 ml of curd and removed the butter.

Five varieties were taken in five sterile bottles and were transported to College of Dairy Science and technology Mannuthy in ice box filled with ice packs, for Analytical study.

**Physical analysis**

Rupa, Rasa, Gandha, Sparsha

**Rasa analysis**

**Taste perception method:** taste with tongue is the criteria for determining the rasa or the anurasa of a drug. The following procedure for taste with tongue was adopted.

- 1) Healthy volunteers, preferably Ayurveda students who may not make mistakes in expressing the Rasa were selected. They were asked to wash their mouth and five minutes gap was allowed between washing of mouth and tasting of drug.
- 2) 5ml of Ghōla was served to volunteers. Chit paper was given to them and they were requested to record the rasa and anurasa they perceived. Likewise Mathita, Takra, Udaśvit and Caccika were given to the volunteers in a gap of one hour.

**Guna assessment:** considering the physicochemical parameters guna of the drug can be assessed. Methodology incorporated for physicochemical analysis are as follows, Specific gravity was assessed by Specific gravity bottle, and total ash.

**Determination of veerya:** 5 conical flask were taken and 100ml of distilled water was taken in each and temperature of water was noted with the help of industrial thermometer. 10 ml of samples of gholam, mathitam, Takram, udasvit and caccika were added in above 100 ml of distilled water, after the

addition temperature was noted with the help of industrial thermometer. This procedure was repeated for three times to avoid human error.

**Vipaka assessment:** Albino rats weighing between 150-180 gm were be selected for each study and divided into different groups of six animals each.

The study performed in two phases.

A - Phase – I: Preliminary Phase: Duration – 5 days.

B - Phase – II: Experimental Phase: Duration – 10 days.

Preliminary study was carried out prior to the experimental phase to understand and obtain base line data about the normal amount of food consumption and water intake of the experimental animals.

**Preliminary Phase**

Initial weights of the rats were recorded and they were placed in separate metabolic cages. Metabolic cages have special arrangements for keeping food and placing water. This arrangement also prevents admixture of food with fecal matter. As the urine is drained out the fecal matter can be collected easily from the cages and urine can be collected in the plastic glasses placed below the funnel. In this phase, daily weight, food intake, water intake, fecal output, urine output, were measured on routine basis. The procedure continued up to 5 days.

**Experimental Phase:** In this phase animals were administered with the selected drugs as per the calculated doses. All the previously mentioned parameters were recorded daily for ten consecutive days.

Determination of *vipaka* was based on the consumption of food and water and quality of faecal matter and urine. The total consumption of food and water in the test group was compared with the control group. The total quantity of faecal matter in the test group was compared with the control group. Along with that weight gain of the rat in each groups and the consistency of faecal matter was taken into consideration for *virya* assessment. The parameters recorded were water ingestion, faecal output, faecal water urine output food conversion ratio.

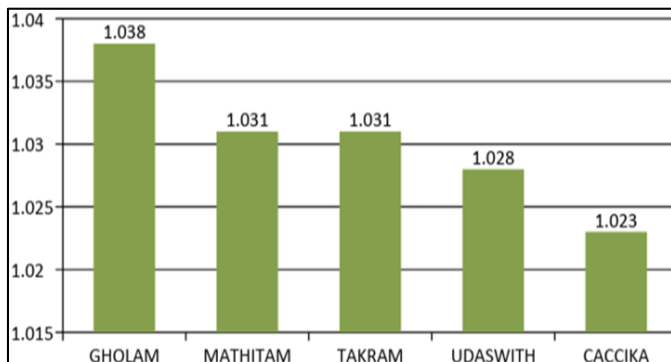
**Observation****Rasa**

**Table 2:** Final conclusion on rasapancaka of takrabhedas

Takrabhedas	Rasa
Ghōlam	Madhura Pradhāna Amlarasa,
Mathitam	Amla Kashaya rasa
Takram	Amla Kashaya rasa
Udaswith	Kashaya-amla rasa
Caccika	Kashaya Pradhana Amla rasa

**Guna****Comparison of Specific Gravity**

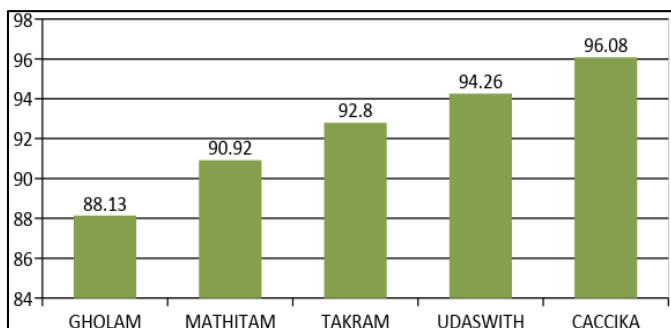
Specific gravity decrease with increase in addition of water, where *caccika* showed statistically significant decrease when compared to gholam, mathitam and *Takram*. (Graph no.1)



Graph 1: Specific gravity

### Comparison of Moisture

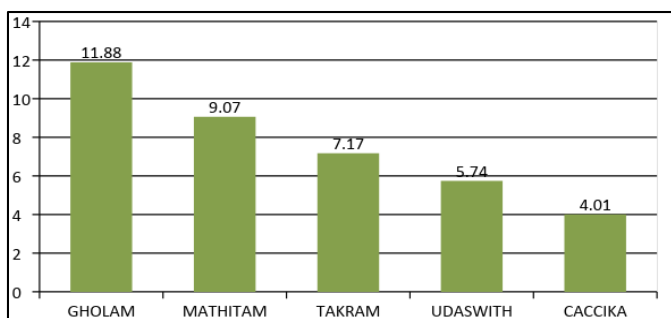
Moisture content increases with increase in addition of water where *gholam* showed statistical significance when compared to *mathitam*, *Takram*, *udaswit* and *caccika*. *Mathitam* showed statistically significant decrease when compared to *udaswith* and *caccika*. *Takram* showed statistically significant decrease when compared to *caccika*. (Graph no.2).



Graph 2: Moisture

### Comparison of Total Solids:

Total ash decreases with increase in addition of water where *gholam* showed statistical significance increase when compared to *mathitam*, *Takram*, *udaswit* and *caccika*. *Mathitam* showed statistically significant increase when compared to *udaswith* and *caccika*. *Takram* showed statistically significant increase when compared to *caccika*. (Graph no.3)



Graph 3: Total Solid

### Veerya

#### Observation on veerya:

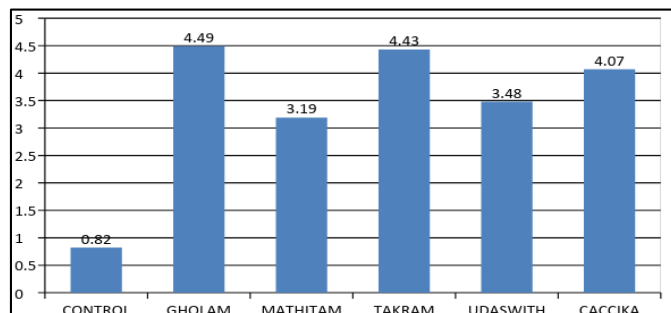
*Veerya* was assessed by endothermic and exothermic reaction. They showed increase in temperature by 1 degree Celsius, thus *veerya* of the drug can be considered as *ushna veerya*.

### Vipaka

**Observation on Vipaka:** Vipaka was assessed base on three parameters: the quantity of faecal matter expelled. Quantity of water expelled and change in the weight of the body.

#### i) Effect of Takrabhedās on urine output

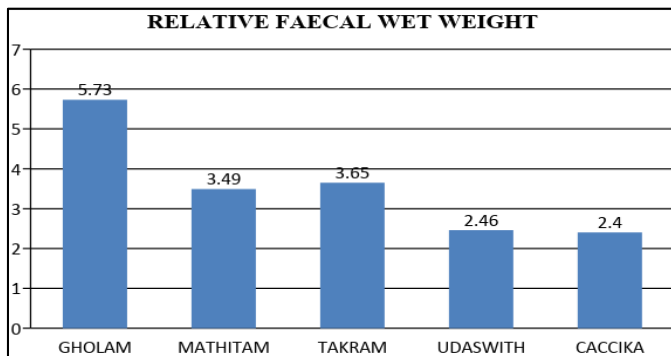
The data shows that there is an increase in the therapeutic value of urine output, of *Ghōlam*, *Takram* *Udaświth* and *Caccikā*, when compared to the therapeutic phase of the control, the observed value is statistically very significant. The data shows that there is an increase in the therapeutic phase of urine output, of *Mathitam* when compared to the therapeutic phase of control group; the observed result is statistically significant. The data shows that there is an increase in the therapeutic phase of *Ghola*, *takra* when compared to the preliminary phase of the same group; the observed result is statistically non-significant. The data shows that there is a decrease in the therapeutic phase of *Mathitam* when compared to the preliminary phase of the same group the result is statistically very significant. The data shows that there is a decrease in the therapeutic phase of urine output *Udaświth* and *Caccikā* when compared to the preliminary phase of the same group, the observed result was statistically non-significant. (Graph.4)



Graph 4: Urine Output

#### ii) Effect of Takrabhedās on faecal wet weight

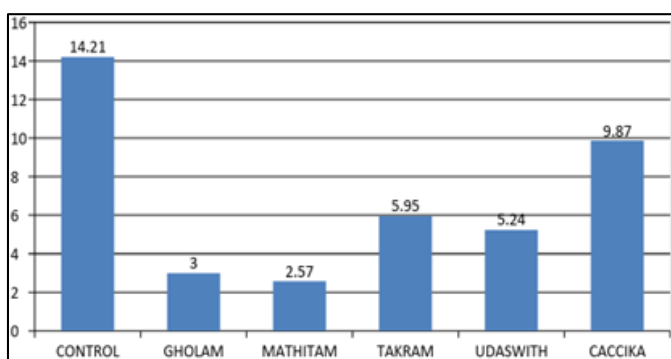
The data shows that there is an increase in the faecal weight wet of the therapeutic phase of *gholam*, when compared to the therapeutic phase of the control, the observed increase was found to be statistically very significant. The data shows that, there is a decrease in the therapeutic phase of the faecal weight wet of the *mathitam* and *takram*, when compared to the therapeutic phase of the control group, the observed decrease is statistically non-significant. The data shows that there is a decrease in the therapeutic phase of faecal wet weight of *udasith* and *chacika*, when compared to the therapeutic phase of the control group, the observed result is statistically very significant. The data shows that there is an increase in the therapeutic phase of faecal weight wet of the *gholam* group as compared to the preliminary phase of the same group, the observed increase is statistically very significant. The data shows that there is a decrease in faecal weight wet therapeutic phase value as of *mathitam* and *takram*, as compared with the preliminary phase of the same group, the observed decrease is statistically non-significant. The data shows that, there is decrease in the faecal weight wet of the *udasith* and *caccika* group, when compared with preliminary phase of the same group, the observed decrease is statistically very significant. (Graph: 5)



Graph 5: Faecal Output

### ii) Effect of Takrabhedas on body weight

The data shows that there is a decrease in the body weight of *Mathitam* and control group, which is statistically very significant. There is significant decrease in the *takram* and *udasvit* group when compared to the control. The data shows that there is decrease in the body weight of *Caccika* when compared to the control group which is statistically non-significant. (Graph 6).



Graph 6: Body Weight

### Discussion

The physical analysis was done on the parameters - Rūpa, Rasa, Ganda and Sparśa.

**Rūpam:** All samples were white in colour. Viscosity was more for Ghōlam, followed by Mathitam, Takram, Udaśvit and Caccika. Snighdata was more for Ghōlam, followed by Takram, Udaśvit and Caccika.

According to Acharya susrutha “Snigha Rukshau Cakshusya”<sup>[6]</sup> from Rupam it seems Ghola to be more Sniggha which goes in decreases with the addition of the water.

**Rasam:** According to Acarya Caraka.”Rasam Nipathe dravyanam”<sup>[7]</sup> on this principle rasa was assessed in the present study Ghōla showed Madhura pradhāna Amlarasa, Mathita showed Amla-kaṣāya rasa, Takra showed Amla-Kaṣāya rasa, Udaśvit showed Kaṣāya-Amlarasa, Caccika showed Kaṣāya pradhāna Amlarasa.

**Gandham:** All the five varieties of takrabhedās showed pleasant, aromatic smell.

**Sparsam:** Snighdata decreases in the order Ghōlam, Mathitam, Takram, Udaśvit, and Caccika.

### Discussion on Guna

#### Discussion on guru and laghu Guna

Specific gravity is the ratio of the density of the substance to

the density of the reference substance. Specific gravity of the substance may be considered as an indication of Gurutwam and laghutwam. As gurutwam is defined as “the quality responsible for gravity or heaviness” In Prasastapada Vyakya it is said as, gururwam Jala Bhumyo patina karana. Rasavaivesika says Guru is Pardhivam Apyam when Pardhivamsam is comparatively more in a substance with equal quantity of water then more will be its Gurutwa. On comparative analysis of Takrabhedās Ghōlam is comparatively guru and Caccika is comparatively laghu.

### Discussion on Snigdha and Ruksha Guna:

It is the indication of total water content of the buttermilk. As the amount of water added during the preparation increases the moisture content also increases. This may be considered as an indication of Gurutwa and Laghutwa of a Dravya. Takra is more guru than jala as the specific gravity of water is 1000kg/m<sup>3</sup> and specific gravity of ‘Takra’ is 1.038kg/m<sup>3</sup>. So when takra and water are mixed together, ‘Takra’ becomes more laghu with addition of water. While comparing the Takrabhedās, Ghōlam is most guru followed by Mathitam, Takram, Udaśvit and Caccika. It may also indicate the Snighdatwa and Rukshatwa of the Takrabhedā with the addition of water into takra the oil droplet per unit volume decreases which in turn decreases the Snighdamsa of the takra. Therefore Snighdatwa decreases and rukshatwa increase in addition of water Total solids may be an indicator of Snighdata and Rūkṣata of the Takra. Total solids in milk include protein, lactose minerals and fats<sup>[8]</sup>. The viscosity of a substance increases with total solid content. More viscous the substance more will be its Snighdata. Rasa Vaisesika says, Bhautika constituent of the Snigdha Guṇa is both Prithvi and Jala. In Takra, Pārthivāmsa Constitue more Snehamsa is responsible for sneha. Therefore the Snighdata decreases with decrease in the total solids.

**Veerya assessment:** *Veerya* was assessed by endothermic and exothermic reaction. They showed increase in temperature by 1degree Celsius, thus *veerya* of the drug can be considered as ushna *veerya*.

**Vipaka assessment:** Vipaka assessment vipaka is defined as the final scholars as the final transformation of substance after digestion. Even though sad vidha, dvididha and trividha vipaka vadas are explained in the classic the most accepted is the trividha vipaka vada. It includes madhura vipaka, Katu vipaka and amla vipaka. The action of the vipaka takes place at the level of dosa, dhathu and mala during the experimental study. Significant increase in the faecal output and urine output was observed and also the water content in the faecal matter was significantly observed. The total effect may be considered as sristavinmutrata<sup>[9]</sup> which may be considered as action of madhura vipaka and amla vipaka. Madhura vipaka is guru and sukrala<sup>[9]</sup> that is it is responsible for increase in weight and Sukra Dhatu on the other hand amla vipaka is opposite to it it is responsible for decreased weight and spermatogenesis. In this study after giving the test drugs the body weight was decreased therefore there is more chance for amla vipaka than Katu vipaka. Further studies have to be conducted in the spermatogenic property of takrabhedas to confirm its vipaka.

**Table 3:** Final conclusion on rasapancaka of takrabhedas

Takrabhedas	Rasa	Guna	Veerya	Vipaka
Gholam	Madhura Pradhāna Amlarasa,	Guru***Snigtha***	ushna	Amla or Katu Vipaka
Mathitam	Amla Kashaya rasa	Guru***Snigtha**	ushna	Amla or Katu Vipaka
Takram	Kashaya, Amla/amla Kashaya rasa	Laghu*Isad Snigdha*	Ushna	Amla or Katu Vipaka
Udaswith	Kashaya-amla rasa	Laghu**Isad Snigdha**	ushna	Amla or Katu Vipaka
Caccika	Lavana/Kashaya Pradhana Amla rasa	Sita, Laghu*** Ruksha	ushna	-

### Conclusion

Rasapanchaka forms the basic pharmacology of Ayurveda. In the classics there exists great variation in the indication of takrabhedas where the difference is only in the dilution factor. Thus here it is noted that dilution factor can make variation in the Guna of each varieties of takra and thus creating wide variation in its indication.

### Limitation

The vipaka of study mentioned by acarya was madhura but in this study contrary to acharyas view there is a possibility of *amla vipaka* also further study on spermatogenic property of *takrabhedas* have to be conducted to confirm the same.

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4. Dr. Vivek. P, Associate Professor, Dept. of Dravya Guna Vijnana.

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