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Assessment of *Grahyagrahyatva* of *Tankan* (*Borax*) by Using Ancient and Modern Parameters

Manisha Dilipsing Pardeshi, Yoginee S. Patil, Gangaprasad R. Asore, S.N. Rajput

1. Associate Professor, *Rasashastra Bhaishajyakalpana*, Dr. Gunvantrao Sarode *Ayurved* Medical College, Hospital & Research Center, Jalgaon.
2. Prof. *Rasashastra* & *Bhaishajyakalpana*, Tilak *Ayurved* Mahavidyalaya, Pune.
3. HOD & Professor, *Rasashastra* & *Bhaishajyakalpana*, APM's *Ayurved* Mahavidyalaya, Sion, Shiv, Mumbai.
4. HOD & Professor *Kriyasharir*, Govt. *Ayurved* Mahavidyalaya, Jalgaon.

***Correspondence author:** pardeshimanisha12@gmail.com

Abstract *Rasashastra* is a valuable stream of *Ayurveda* which deals with the study of identification of raw drugs, various procedures, and the therapeutic utility of mercury, metals, minerals, and other such drugs. Formulations in *Rasashastra* have become more popular because of their efficacy and potent results in small quantities. The standardization of the final product depends on the quality of the raw material. Therefore, it is mandatory to maintain the standardization of raw drugs to assess parameters for identity, purity, quality, and efficacy of the final product. *Tankan* is an important drug described in *Rasashastra*, having its reference in early classical texts of *Ayurveda*. An attempt is made to correlate the parameters used for standardization based on *Ayurvedic* classics with the current physico-chemical parameters in the present research work.

Keywords *Tankan*, **borax**, *Tankankshara*, physico-chemical parameters, *grahya lakshana*.

Introduction *Rasashastra* consists of the study of raw material, identification, various procedures, and therapeutic utility of mercury, metals, minerals, and other such drugs. Formulations of *Rasashastra* are popular due to their efficacy and potent results in small quantities. Thus, it is mandatory to maintain the standardization of raw drugs to assess parameters for identity, purity, quality, and efficacy of the final formulation. Alkali *Tankankshara* has a tendency to produce dryness in organisms, generate *vayu*, cause the derangement of *Pitta*, and subdue *Kapha*; it is also

appetizing in its property. It is sharp in its potency. Chemically, *Tankan-Borax* is $Na_2B_4O_7 \cdot 10H_2O$. It is also known as *Kshararaj*, *Suhaga*, *Dravak Saubhagya*, *Ksharshreshtha*, *Shvetkshar*, *Khadiokhar*, and *Sitkshar*.

According to *Ayurved Prakasha* and *Rasendrasar Sangraha*, *Tankan* is classified in *Kshartray*, *Ksharpanchak*, and *Dravakgan Mitrapanchak*. It is procured from salt lakes in the form of crystals, usually obtained from Searle's Lake in California or Leh in Jammu & Kashmir. In the *Samhita*, *Sushrutacharya* described *Tankana* with its pharmaceutical properties in the *Sushrutasamhita* for the first time. *Tankana* is a cost-effective, abundantly available, and safe medication. However, assessing its quality—especially identifying the types of *Tankan* having *grahya lakshana* (acceptable standard sample) available today—is a challenging job, and raw material standardization is required.

Standardization of the raw sample is a prime need in present research, as identity, purity, and quality are fundamentals of quality control. This study is designed to assess the *grahyagrahyatva* of *Tankan* to fill the knowledge gap regarding the correlation between ancient and modern parameters.

Aim To assess the *grahyagrahyatva* of *Tankan* by using ancient and modern parameters.

Objectives Primary Objectives:

- To collect raw samples of *Tankan* from various sources.
- To enlist and prepare a database which is the initial framework for the assessment of *grahyagrahyatva* of *Tankan*.
- To design a special proforma based on the database.
- To select and enlist relevant geological parameters useful for the assessment of the quality of *Tankan*.

Secondary Objectives:

- To observe the characteristics of *grahya* (acceptable) and *agrahya* (unacceptable) samples of *Tankan*.
- To fill up a specially designed proforma by experts.
- To apply geological tests for the assessment of quality standards of all samples.
- To fix a statistically significant range of *grahya Tankan* parameters by applying pharmaceutical statistics.
- To test selected samples analytically with advanced techniques for the finalization of the most *grahya* and *agrahya* samples.
- To establish a correlation between the parameters of ancient and modern norms.

Methodology A literature review was conducted from ancient and modern texts covering *Niruktee* (word derivation), historical review, classification, synonyms, *Rasapanchak*, *Shodhana*, and therapeutic properties. According to *Acharya Sushruta*: *Virukshano anilkar: shlesmaghna pittadooshana:| Agnideeptikarsteekshna Tankanakshar uchyate*. (The alkali known as *Tankankshara* tends to produce dryness,

generates *vayu*, subdues *kapha*, and is sharp in potency).

Tankan is classified based on occurrence (*Khanija*, *Kritrim*), place of origin (*Swayambhu*, *Banavati*, *Pashan*), availability (*Sonari*, *Chaukiya*), physical appearance (*Telia*, *Patiya*), and *grahyagrahyatva* (*Sphatikabha*, *Pandur*, *Gudprabha*). *Nilkantha* is a type with a bluish tinge which is *grahya* (acceptable).

Total 17 samples of *Tankan* were procured from various markets and pharmacies, with GPS locations maintained and labeled (TG1 to TG17). A validated proforma was filled by twelve experts from fields such as *Rasashastra*, *Ayurvedic* practice, and Geology. Samples were assessed via organoleptic tests, geological tests, and physicochemical analysis (pH, solubility, flame test). Weight versus volume tests and XRD analysis for crystalline structure were performed for final quantitative estimation.

Observations and Results All data (qualitative and quantitative) generated was considered for selecting *grahya* and *agrahya* samples.

Samples	**Proforma score**	**Proforma score**	**Ranking**	**PH**	**Specific gravity**	**V4 (volume of lahi)**	**W4 (weight of lahi)**	**Volume verses weight test**
Initial code	**Final code**							
T12	TG1	1259	1	10.68	1.68	210	28.680	1
T3	TG2	1155	2	10.74	1.7	90	34.137	4
T11	TG3	1127	3	10.74	1.69	185	32.504	2
T6	TA1	735	17	10.67	1.7	120	31.711	3
T15	TA2	770	16	10.71	1.7	90	34.061	5
T13	TA3	805	15	11.10	1.67	80	40.172	6

XRD Results: In the XRD of the two selected samples, maximum spots were observed in the *grahya* sample (TG1) compared to the *agrahya* sample (TA3). This indicates the matching of the TG1 peak with the standard peak of the *Tankan* sample.

Discussion Amongst the twenty-eight *grahya* criteria, eight are related to colour, making it the most important parameter for assessment. The newly developed weight versus volume test was useful for identifying potential adulteration, such as chalk powder or *khadiyamitti*. It is essential to procure quality samples of *Tankan* to achieve therapeutic efficacy, particularly for its role as an antidote for *Vatsnabha* (*Aconitum ferox*). The study proves that ancient parameters are practicable, feasible, and reproducible for selecting good quality drugs, though advanced physicochemical tests are essential for accurate chemical determination. *Grahya* quality can be easily identified by observing the formation of *Tankan lahi* (puffed borax).

Conclusion The research reveals that sample TG1 (T12), collected from Chennai, Tamil Nadu, was the best sample, while TA3 (T13), from Sirohi, Rajasthan, was the *agrahya* sample. TG1 had the highest proforma score, a superior ranking in the weight versus volume test, and physicochemical readings near API standards. Sample TG1 is the most *grahya* as confirmed by XRD analysis matching the standard peak. Conversely, TA1 and TA3 were *agrahya* due to low scores and poor matching in XRD. All subjective and objective tests provided similar results, confirming that both classical and modern parameters are effective for assessment.

Assessment	Parameter
Identity	Proforma, Organoleptic tests, Geological Tests
Purity	Organoleptic tests, Weight verses Volume Test, Geological tests, chemical Tests
Quality	Organoleptic tests, Weight verses Volume Test, Geological tests, chemical Tests, XRD Test

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