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Research article

A Comparative Chemical analytical study of Mercuric Chloride (*Veeram*) on before and after purification

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Abstract

Introduction

Purified Per-chloride of Mercury (*veeram*) is being used in Siddha system of Medicinefor curing gastric ulcer, leprosy, severe *vatha* diseases and venereal diseases, etc. thus is no adverse effect during the use of this drug so far.

Objective

To find out the chemical compounds present is the *veeram* before and after purification by chemical analysis.

Methodology

Physico-chemical parameters, Preliminary Tests, Tests for Acid Radicals, Tests for Basic Radicals and Other constituents with international parameters.

Result:

The chemical analysis also will helpful to find out the other heavy metals and unwanted compounds project in the *veeram* from this analysis the active pharmacological and toxic compounds may be identified.

Conclusion

The physiochemical analysis shows that some chemical compounds disappeared after purification like Silicate and Aluminum. So, the purification process of raw drug applied in siddha system of medicine is essential before drug preparation. This study will be alerted to further research in *veeram*.

Keywords

Veeram (perchloride of Mercury), Purification, Qualitative Chemical Analysis.

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Introduction

Veeram (*savveeram*)– Hydrargyrum Perchloride; perchloride of Mercury was first used as a therapeutic agent for venereal diseases during the middle of the eighteenth century in western countries. But for many centuries the perchloride of mercury has been used in India for the treatment of various disorders. This is as such quite toxic and it should be used only after purification and detoxification.

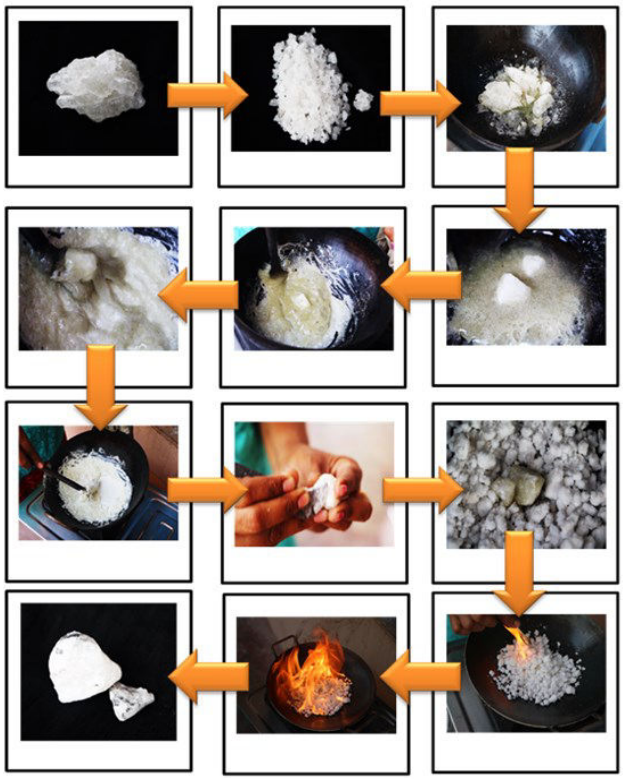
Purified perchloride of Mercury (*veeram*) Bitter in taste, Hot Potency and it has gotten body improving tonic, antiseptic and ulcerogenic properties in Siddha system of Medicine. It is used to cure the following diseases; gastric ulcer, leprosy, severe *vatha* diseases and morbid growth of flesh, throbbing pain associated diseases, venereal diseases, bubo in the groins occurs to the female and male due to forcefulness of sexually contact as explained in the siddha Tamil text. And it is also used for various types of eye diseases. Its prepared medicines were; *maha-veera mezhugu, veera mathirai as thiri thoda mathirai, savveera chendooram, savveera kattu, veera rasa parpam, veera neer (for local application), veera kalimbu, veera kulampu as amirtha vennai or amirtha mezhugu and jaya-veera rana singi kayiru,* etc.

This is produced high toxicity when consume unpurified form or over dose of prepared medicines in prolong period. In these critical condition siddha text list antidotes for *veera* poison such as; tender coconut water neutralizes the toxicity of mercuric chloride. White yolk of the egg, mixed with water or milk should be given often. 20ml of *Tribulus terrestis* Linn. juice should be given to the victim in the morning and evening daily. And 20ml of juice of *Vernonia cinerea* consumed twice daily which also acts as an antidote.

Physic chemical analysis is necessary to find out active compounds present in the veeram (Per chloride of Mercury) on before and after purification.

MATERIALS AND METHODS

Procurement and genuine of raw drugs



The Natural *Veeram* were properly collected from country merchant shop, Nagarcoil and Unit of Mineralogy, Department of Gunapadam, Govt. Siddha Medical College, Tirunelveli, Tamil Nadu has authentication certified that the above raw materials were genuine one according to the physical and chemical nature of the compound [6,7].

Purification of Veeram

Veeram (raw-purified)
Padigaram(Alum)
Soodam(Camphor)

Method of purification

Melt 105g (03 *palam*) of *padigaram* in iron vessel, place 01 *palam* (35g) of Per-chloride of mercury (*veeram*) on it and turn *veeram* up side down using iron knife. *Veeram* must not stick to the base of the vessel, care should be taken while turn it up side down. Continue this process till *padigaram* becomes completely dry and then allow it for cooling. Use knife to remove the *padigaram* which is settled over *veeram*. Take 1 ½ *palam* (52g) of *soodam* and then powdered. Cover the powdered *soodam* over the *veeram* and fire it. Then cooling for sometimes. Reference: *Anuboga vaithya navaneetham, part-1, Author-Hakkeem. B. Mugamathu Abdulla Sayabu, Thamarai noolagam publication, Edition, 1995, page No- 120.*

Sample design:

Sample 1: Raw *Veeram* (Unpurified) – before purification
Sample 2: Purified *Veeram*– after purification

Chemical Analytical methods:

In this research, only analysis the physic chemical and qualitative bio-chemical analysis only comparative with both unpurified and purified *veeram* in Biochemistry Laboratory, Department of Biochemistry, Govt. Siddha Medical College, Tirunelveli and VS Clinical Research and Hospital Private ltd., Taramani, Chennai.

Physico-chemical parameters:

Determination of Total Ash

2 to 3 g of drug was weighed in the pre weighed and tarred Gooch crucible was kept in the muffle furnace at a temperature not exceeding 450ºC until free from carbon then cooled and weighed and the percentage of the total ash content were calculated with reference to the air dried drug.

Determination of Acid Insoluble Ash

The ash obtained from total ash was boiled with 25ml of dilute hydrochloric acid for 5 minutes and insoluble matter were collected in an ash less filter paper, washed with hot water and ignited to constant weight. Later the percentage of the acid insoluble ash content was calculated with reference to the air dried drug.

Determination of Water Soluble Ash

The ash obtained from total ash content was boiled with 25 ml of water for 5 minutes and insoluble matter were collected in an ash less filter paper, washed with hot water and ignite for 15 minutes at a temperature not exceeding 450ºC the weight of the insoluble matter were subtracted from the weight of the ash. The difference in weight represents the water soluble ash and the percentage of the water soluble ash content were calculated with reference to the air dried drug

Determination of alcohol soluble extractive

5g of coarsely powdered air dried drug was macerated with 100ml of absolute alcohol in a closed flask for twenty-four hours, shaken frequently during six hours and allowed to stand for eighteen hours. After filtering the solution 25ml of this filtrate was evaporated in a tared flat bottomed shallow dish, and dried at 105ºC until a constant weight was obtained. Later the percentage of alcohol-soluble extractive with reference to the air-dried drug was calculated.

Determination of water soluble extractive

5g of coarsely powdered air dried drug was macerated with 100ml of chloroform-water in a closed flask for twenty-four hours, shaken frequently during six hours and allowed to stand for eighteen hours. After filtering the solution 25ml of this filtrate was evaporated in a tared flat bottomed shallow dish, and dried at 105ºC until a constant weight was obtained. Later the percentage of water-soluble extractive with reference to the air-dried drug was calculated.

Determination of Moisture Content (Loss on Drying)

5 g of the drug without preliminary drying was weighed accurately in a tarred evaporating dish, dried at 105ºC for 5 hours, cooled in desiccator and weighed. Later the drying and weighing process was continued at one hour interval until difference between two successive weighings of sample corresponds to not more than 0.25 percent. When the constant weight was obtained the percentage of moisture content was calculated with reference to the air dried drug.

Preparation of solution for physiochemical analysis of *Veeram*

5gm of unpurified *Veeram* (V1), purified *Veeram* method1 (V2) were taken in a 250ml of clean beaker and 50ml of distilled water was added to it. Then it was boiled well for about 10 min. Then it is allowed to cool and filtered in a 100 ml volumetric flask and made up to 100ml with distilled water. This preparation is used for the qualitative analysis of acidic/ basic radicals and biochemical constituents in it.

In tests and analysis where applied;

- A preliminary test for Copper, Sodium, Silicate and Carbonate: test for silicate, action of heat, Flame test, Ash test
- Test for Acid Radicals: Test for; Sulphate, Chloride, Phosphate, Carbonate, Nitrate, Sulphide, Fluoride & Oxalate, Nitrite.
- Test for Basic Radicals: Test for; Lead, Copper, Aluminum, Ferrous & Ferric, Zinc, Calcium, Magnesium, Ammonium, Potassium, Sodium, Mercury, Arsenic
- Other constituents: Test for; starch, reducing sugar, alkaloids, tannic acid, unsaturated compound and amino acids

RESULTS

Physicochemical Parameters of Mercuric Chloride – (Veeram)

Tests performed	Result	
Sample	V1	V2
Color	Pure white	Pure white
Odour	Odourless	Odourless
Moisture Content	66.01%	66.04%
(Loss on Drying)		
Total Ash	0% Ash content	0% Ash content
Acid Insoluble Ash	-	-
Water soluble Ash	-	-
Alcohol soluble extractive	20.02%	23.67%
Water soluble extractive	20.35%	19.517%
pH	2.32	2.39

DISCUSSION AND CONCLUSION

According to the result in physic-chemical analysis; Color and Odour of the both before and after purification of the Per-chloride of mercury (*veeram*) were same as Pure white and Odourless. Moisture Content (Loss on Drying) was unpurified *veeram* was 66.01% and purified *veeram* was 66.04%. Both of the *veeram's* Total Ash was 0% Ash content Alcohol soluble extractive unpurified *veeram* was 20.02% and purified *veeram* was 23.67%. Water soluble extractive of unpurified *veeram* was 20.35% and purified *veeram* was19.517%. pH of unpurified *veeram* was 2.32 and purified *veeram* was 2.39.In the preliminary test for this both *veeram* performed were same in action of heat by carbonate, and Ash test by Sodium as presence of elements. Flame test were same by copper as absence in both sample of *veeram*. But test for silicate were performed presence was found in unpurified *veeram* and absence in purified *veeram*.

Table 2. Qualitative Analysis: A preliminary test for Copper, Sodium, Silicate and Carbonate;

S.No	Chemical Test	Observation		Inference	
		V1	V2	V1	V2
1	**Test for Silicate** A little (500mg) of the sample is shaken well with distilled water. A little (500mg) of the sample is shaken well with con. HCl / Con.H_2SO_4	Sparingly soluble	Sparingly not soluble	Presence of Silicate	Absence of Silicate
2	**Action of Heat:** A small amount of the sample is taken in a dry test tube and heated gently at first and then strong.	White fumes evolved	White fumes evolved	Presence of Carbonate	Presence of Carbonate
3	**Flame test:** A small amount (500mg) of the sample is made into a paste with con . HCl in a watch glass and introduced in to the non luminous part of the Bunsen flame.	Bluish green flame not appeared.	Bluish green flame not appeared.	Absence of Copper	Absence of Copper
4	**Ash test:** A filter paper is soaked in to a mixture of sample and dil. cobalt nitrate solution and introduced in to the Bunsen flame and ignited.	Yellow colour flame appeared.	Yellow colour flame appeared.	Presence of Sodium	Presence of Sodium

Table. 3 **Test for acid radicals**

S.NO	EXPERIMENTS	OBSERVATIONS		INFERENCE	
		V1	V2	V1	V2
1	**Test for Nitrate:** 01gm of the substance was heated with copper turning and concentrated H_2SO_4 and viewed the test tube vertically down.	Brown gas was not evolved	Brown gas was not evolved	Indicates the absence of Nitrate.	Indicates the absence of Nitrate.
2	**Test for Sulphide**: 1 gm of the substance was treated with 2ml of con.HCL.	Rotten egg smell was not evolved	Rotten egg smell is not evolved	Indicates the absence of Sulphide	Indicates the absence of Sulphide
3	**Test for Fluoride & Oxalate:**2ml of extract was added with 2ml of dil. Acetic acid and 2 ml dil. Calcium chloride solution and heated.	Absence of Cloudy appearance	Absence of Cloudy appearance	Indicates the absence of Fluoride & Oxalate were absent	Indicates the absence of Fluoride & Oxalate were absent
4	**Test for Nitrite:** **3** drops of the extract was placed on a filter paper, on that 2 drops of dil. acetic acid and 3drops of dil. Benzidine solution were placed	No Characteristic changes appeared	No Characteristic changes appeared	Indicates the absence of Nitrite	Indicates the absence of Nitrite

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Table 4. Test for Basic radicals

S.NO	EXPERIMENTS	OBSERVATIONS		INFERENCE	
		V1	V2	V1	V2
1	**Test for Lead:** 2 ml of the extract was added with 2 ml of dil. potassium iodine solution	No Yellow precipitate formed	No Yellow precipitate formed	Indicates the absence of Lead	Indicates the absence of Lead
2	**Test for Copper** One pinch(50mg) of substance was made into paste with con.HCL in watch glass and introduced into the non-luminuous part of the flame	Blue colour precipitate was not formed	Blue colour precipitate was not formed	Indicates the absence of Copper	Indicates the absence of Copper
3	**Test for Aluminium:** In the 2 ml of extract dil. sodium hydroxide was added in 5 drops to excess	Yellow colour formed	Yellow colour was not formed	Indicates the presence of Aluminium	Indicates the absence of Aluminium
4	**Test for Magnesium** In 2 ml of extract dil. Sodium hydroxide solution was added in drops to excess	White precipitate not formed	White precipitate not formed	Indicates the absence of Magnesium	Indicates the absence of Magnesium
5	**Test for Ammonium:** In 2ml of extract 1 ml of Nessler's reagent and excess of dil. Sodium hydroxide solution were added	Brown colour not formed	Brown colour not formed	Indicates the absence of Ammonium	Indicates the absence of Ammonium
6	**Test for Potassium:** A pinch (25mg) of substance was treated with 2 ml of dil. Sodium nitrite solution and then treated with 2 ml of dil. cobalt nitrate in 30% dil. glacial acetic acid	Yellowish precipitate not formed	Yellowish precipitate not formed	Indicates the absence of Potassium	Indicates the absence of Potassium
7	**Test for Sodium** 2 pinches (50mg) of the substance was made into paste by using HCL and introduced into the blue flame of Bunsen burner	Yellow colour flame appeared	Yellow colour flame appeared	Indicates the presence of Sodium	Indicates the presence of Sodium
8	**Test for Mercury** 2ml of the extract was treated with 2ml of dil. sodium hydroxide solution	Yellow precipitate formed	Yellow precipitate formed	Presence of Mercury	Presence of Mercury
9	**Test for Arsenic** 2ml of the extract was treated with 2ml of dil. sodium hydroxide solution	Brownish red precipitate not formed	Brownish red precipitate not formed	Indicates the absence of Arsenic	Indicates the absence of Arsenic

Table 5. Other constituents

EXPERIMENTS	OBSERVATIONS		INFERENCE	
	V1	V2	V1	V2
Test for the Alkaloids a)2 ml of the extract is treated with 2 ml of dil. potassium Iodide solution	Reddish brown precipitation not formed	Reddish brown precipitation not formed	Indicates the absence of Alkaloids	Indicates the absence of Alkaloids
b)2ml of the extract is treated with 2ml of dil. Picric acid	Yellow precipitation not formed	Yellow precipitation not formed	Indicates the absence of Alkaloids	Indicates the absence of Alkaloids

In test for acid radicals were same in both unpurified and purified *veeram* in specially; nitrate, sulphide, fluoride & oxalate and nitrite. In test for basic radicals were found same result in both of *veeram* as absences of lead, copper, magnesium, ammonium, potassium and Arsenic and presence of Sodium and Mercury. But Aluminum presence in unpurified *veeram* and absence in purified *veeram*.

It is concluded as; that the aim of research is to find out the any physiochemical changes occur in the purification process of *veeram* as per Siddha literature. The physiochemical analysis shows that some chemical compounds disappeared after purification like Silicate and Aluminum. So, the purification process of raw drug applied in siddha system of medicine is essential before drug preparation. This study will be alerted to further research in *veeram*.

CONFLICT OF INTEREST

None declared

SOURCE OF FUNDING

Nil

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