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# Evaluating the Antidote Action of Nimbuk Swarasa and Peya in Jayapala Toxicity: A Critical Review

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**Abstract:** *Jayapala (Myristica fragrans), a plant-based toxin, is recognized for its therapeutic importance despite its toxic properties. Improper administration or insufficient purification can lead to adverse effects, including gastrointestinal irritation, salivation, and even death. The management of Jayapala poisoning is well-documented in classical Ayurvedic texts, with specific antidotes such as Nimbuk Swarasa (lemon juice) and Peya (rice water) being highlighted. This review critically evaluates the mode of action of Nimbuk Swarasa and Peya in Jayapala poisoning, to establish their therapeutic efficacy and practical applicability as antidotes. The study highlights the antidotal potential of Nimbuk Swarasa and Peya in enhancing digestive function, alleviating symptoms, and providing a cost-effective solution for managing Jayapala toxicity. The findings indicate that these preparations not only mitigate harmful effects but also embody a practical approach to addressing accidental poisoning.*

**Keywords:** Jayapala, Croton Tinglium, Nimbuk Swarasa, Peya, Toxicity, Rechana, Upavisha

## I. INTRODUCTION

Jayapala (Myristica fragrans), categorized as an Upavisha (lesser toxic substance) in Ayurvedic classics like Rasatarangini, Rasaratna Samucchaya, and Sushruta Samhita, holds notable therapeutic importance despite its toxic properties. Traditionally, it has been utilized in formulations addressing conditions such as Jwara (fever) and Udara Roga (abdominal disorders. Visha (poisons) are broadly classified into two categories: Sthavara Visha (plant-based toxins) and Jangama Visha (animal-based toxins). Jayapala is identified under Sthavara Upavisha, specifically as Phalavisha due to its origin from seeds. It is renowned for its purgative properties and is often referred to as Dantibeeja. Although it holds therapeutic potential, improper administration or insufficient purification may lead to adverse effects including gastrointestinal irritation, salivation, bloody stools, tachycardia, and in severe cases, collapse or death. The management of Jayapala poisoning is well-documented in classical Ayurvedic texts, with specific antidotes such as Dhanyaka (coriander), Dadhi (curd) with Sita (sugar), Ela (cardamom), and most notably, Nimbuk Swarasa (lemon juice) combined with Peya (rice water) being highlighted in Chikitsa Prabhakar. Given the accidental nature of Jayapala poisoning and the risk of its misuse as an abortifacient, identifying a widely accessible, cost-effective antidote is essential. Nimbuk Swarasa and Peya offer promising solutions, as they are both readily available and easy to prepare, making them suitable for immediate intervention even by common individuals.

This study critically evaluates the mode of action of Nimbuk Swarasa and Peya in the context of Jayapala poisoning, with the aim of establishing their therapeutic efficacy and practical applicability as antidotes

## II. MATERIAL AND METHODS

This review critically analyzes the mode of action of Nimbuk Swaras and Peya as antidotes in Jaypala poisoning by compiling data from classical Ayurvedic texts and recent scientific literature. A systematic search was conducted using Ayurvedic treatises and modern databases like PubMed and Google Scholar, focusing on studies related to Citrus medica and Croton Tinglium along with Peya.


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## III. REVIEW OF LITERATURE

### 3.1 Jayapala

**1) Jayapala in Ayurvedic View**:

**Rasapanchaka of Jayapala:**[1]

Jayapala (Croton tiglium) is described in Ayurveda with the following Rasapanchaka:

- Rasa (Taste): Katu (Pungent)
- Virya (Potency): Ushna (Hot)
- Vipaka (Post-digestive effect): Katu (Pungent)
- Prabhava (Specific action): Rechak (Purgative)
- Karma: Kapha-pittaghna (Pacifies Kapha and Pitta)
- Guna (Qualities): Guru (Heavy), Ruksha (Dry), Tikshna (Sharp)

**Prayojya Amga (Useful Part):**[2]

Jayapala Beej and Taila are the primary components used in medicinal formulations. However, the seed, if used improperly, is highly toxic and requires Shodhana (purification) before administration.

Synonyms of Jayapala

- Rechaka (That which causes purgation)
- Beeja rechaka (seeds that cause purgation)
- Jayapala (that which wins over diseases)
- Dantibeeja (seeds resembling that of Danti)
- Maladravi (that which causes liquid defecation)
- Sheegra (fast-acting drug)

These synonums reflect the poisonous effects of jayapala.

Toxicity of Jayapala (Croton tiglium):

Fatal Dose:[3]

- Beej: 2 – 4 Ratti
- Taila: 20 drops
- Fatal Period:[4] 4 – 6 hours

**2) Jayapala in Modern Science View:**

**Pharmacological Properties:**[3]

Jayapala seeds contain bioactive compounds like phorbol esters, which have notable pharmacological effects such as:

- Antitumor
- Gastrointestinal
- Analgesic
- Antinociceptive
- Antiviral (including anti-HIV)

Despite these benefits, the unpurified form of Jayapala can cause severe toxicity. Its improper usage leads to gastrointestinal irritation, vomiting, purging, and abdominal pain, with potential fatality. Therefore, Shodhana is crucial for safe therapeutic use.

**Toxicity Symptoms:**

Table I : Toxicity Symptoms Of Jayapala

| Symptoms | Ayurvedic Terminology |
|---|---|
| Vomiting | Chhardi |
| Salivation and nausea | Hrullas |
| Hot burning pain from the mouth to stomach | Daha |

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|---|---|
| Purging | Rechan |
| Bloody stools with gripping pain | Raktagamana |
| Tachycardia (rapid heartbeat) | Shwasa |
| Vertigo | Bhrama |
| Circulatory and respiratory collapse | Vinamana |
| Death | Marana |

Treatment for Jayapala Poisoning:

- Stomach wash to remove toxic substances
- Demulcent drinks like milk or egg white to soothe the gastrointestinal tract
- Morphine with atropine to alleviate pain and reduce intestinal secretions
- Glucose and saline administered intravenously

### 3.2 Nimbuk

**Nimbuk in Ayurvedic View:**

Nimbuk, also known as Citrus medica, belongs to the Rutaceae family and is widely recognized for its medicinal applications in Ayurveda. It is renowned for its pittaprashamana (Pitta-pacifying) properties. The fruit's composition, including citric acid and vitamin C, provides numerous therapeutic benefits, particularly in conditions involving aggravated Pitta, such as hyperacidity, fever, and vomiting

Table II. Gereral Introduction to Nimbuk

| **Attribute** | **Details** |
|---|---|
| Latin Name | Citrus medica |
| Family | Rutaceae |
| Common Marathi Name | Limbu |
| Chemical Constituents | Citric Acid, Vitamin C |
| Doshakarma | Pittaprashamana (Pacifies Pitta) |

**Guna and Prayoga (Properties and Usage):**[5]

Nimbuk is traditionally described as Deepana (enhancing digestive fire), Pachana (promoting digestion), and Ushna (slightly warm in potency). These attributes make it especially beneficial in stimulating digestion, improving appetite, and managing digestive issues. Nimbuswarasa (lemon juice) is commonly prescribed for managing conditions such as fever, diarrhea, and vomiting, especially when aggravated Pitta is involved.

Citron Uses Based on Ripe Fruit Table: [6]

Table III. Ripe Citron Uses

| **Property** | **Effect/Usage** |
|---|---|
| Deepana | Enhances digestive strength |
| Laghu | Light and easy to digest |
| Kanta Shodhana | Cleanses the throat |
| Hrudya | Acts for crdiac health |
| Varnakara | Improves complexion |
| Pushtikara | Nourishes and strengthens the body |
| Balakara | Boosts immunity and strength |

These properties make the ripe fruit of Nimbuk a multi-functional remedy for several systemic conditions in Ayurveda.

Indications for Nimbuk (Citrus medica)

Table IV: Indications of Nimbuk

| Condition | Description |
|---|---|
| Raktapitta | Bleeding disorders (e.g., nasal bleeding) |

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|---|---|
| Shwasa | Asthma, chronic respiratory disorders |
| Kasa | Cough, cold |
| Aruchi | Anorexia |
| Trushna | Excessive thirst |
| Shoola | Abdominal colic pain |
| Ajeerna | Indigestion |
| Vibandha | Constipation |
| Kaphashwasa | Cough with sputum |
| Mandagni | Low digestive strength |
| Shopha | Inflammation |
| Arti | Pain |

**Nimbuk in Modern Medicine View:**[7]

Nimbuk (Citrus medica) is rich in several bioactive compounds that contribute to its medicinal properties. Flavonoids, including apigenin, hesperetin, naringin, and quercetin, provide powerful antioxidant, anti-inflammatory, and antimicrobial effects, making Nimbuk effective in neutralizing free radicals, reducing inflammation, and fighting infections. Coumarins such as citropten, scoparone, and bergapten further enhance its antioxidant and anti-inflammatory properties, supporting its use in managing inflammation-related conditions and protecting cellular health. Additionally, terpenes like limonene, γ-terpinene, and limonin offer antiviral and antimicrobial benefits, making Nimbuk useful in boosting immunity and providing protection against viral and bacterial infections. Together, these compounds highlight Nimbuk's wide-ranging therapeutic potential.

Citron for Acid Peptic Disorders Table

Nimbuk (Citrus medica) can be administered in various forms to address digestive issues. Fresh juice is commonly used to soothe gastric irritation and pacify excessive acidity, making it effective for conditions like hyperacidity. Syrup made from Nimbuk helps reduce symptoms of hyperacidity and provides relief from acid peptic disorders. Additionally, jelly prepared from Nimbuk is beneficial in alleviating gastric discomfort and promoting healthy digestion, supporting its use in managing digestive imbalances.

### 3.3 Peya

Peya is a pathya preparation which is light in nature, making it easy to digest.

As a result, it helps in pacifying diseases, strengthening the body, nourishing the tissues (dhatus), stimulating digestive fire (agni), and promoting the downward movement of Vata dosha (vata anulomana).

Peya Preparation Method[8]

Table V. Prepration Method Of Peya

| Ingredient | Proportion | Description |
|---|---|---|
| Odana (Rice) | 1 part | Cooked until soft and well-done in water |
| Jala (Water) | 14 parts | Used to cook the rice and form a watery mixture |
| Final Formulation | Solid rice + Liquid | Rice gruel where watery content is collected with a few grains of rice |

**Guṇa (Properties)**

Peya is laghu and sukha-jīrya, effectively acting as an agnidīpana and pācana, ensuring proper digestion. It also supports vāta-anulomana, promoting the normal flow of Vata dosha.

Vyadhi Vishesh Prayogaḥ (Therapeutic Uses)[9][10]

Peya is suggested as a therapeutic intake for following vyadhi:

Table VI. Indications of Peya

| Condition | Description |
|---|---|
| Jwara | fever alleviation |
| Atisara | manages diarrhea caused by vitiated Vata and Pitta |
| Raktapitta | Adhoga Raktapitta |

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Principles of Administering Peya in Adhoga Raktapitta

Table VII. Principles of Administering Peya in Adhoga Raktapitta

| Condition | Treatment Approach |
|---|---|
| Santarpanotta Adhoga Raktapitta | After Langhana, Peya is administered |
| Apatarpanotta Adhoga Raktapitta | In cases of undernourishment, Peya is given directly without Langhana |

## IV. DISCUSSION

**Probable Samprapti Of Jayapala Poisoning In Ayurvedic View:**

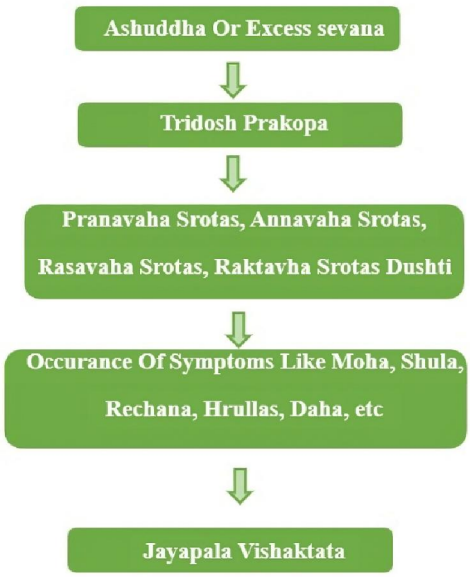


Fig. 1. Probable Samprapti Of Jayapala Poisoning In Ayurvedic View

Ashuddha beeja sevana causes pittapradhana tridoshadushti by tikshn, ushna guna, katu rasa and vipaka and Ushnavirya. This results into Atipravritti srotovaigunya. The symptoms of srotovaigunya are discussed below:

**Classification Of Symptoms As Per Srotodushti:**

The symptoms can be classified according to the affected Srotas:

- Pranavaha Srotas Dushti: Moha, Bhrama, Vinamana, Shwasa, Marana.
- Annavaha Srotas Dushti: Shula, Chhardi, Rechana, Marana.
- Rasavaha Srotas Dushti: Hrullas, Tama, Moha, Bhrama, Vinamana, Shwasa, Marana.
- Raktavaha Srotas Dushti: Daha, Shonitagamana, Asyapaka. Shonit Aagamna further results intoatirktasrava with symptoms of moha, bhramna, tam and daha which end as marana.

**Samprapti Ghataka of Jayapala Toxicity**

Table VIII. Samprapti Ghataka of Jayapala Toxicity

| **Samprapti Ghatak** | **Details** |
|---|---|
| Dosha | Tridosha Dushti |
| Dushya | Dhatu : Rasa, Rakta |
| | Mala: Purisha |
| Agni | Mandagni |
| Srotas | Pranavaha, Annavaha, Rasavaha,Raktavaha |
| Udbhava Sthana | Amashaya |

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|---|---|
| Adhisthana | Pakwashaya |
| Vyakta Sthana | Mukha, Amashaya, Pakwashya, Guda, Shira, Hridaya |
| Srotodushti Prakara | Atipravritti, Vimargagamana |

**Probable Mode Of Action Of Nimbuk Swarasa in Sampraptivightana of Jaypal Toxicity**

**Agni Vriddhi**

Nimbuk Swarasa and Peya work by enhancing Agni through Deepana and Pachana by amla guna and amla vipaka along with ushna virya.improving overall digestive function.

**Dosha Pachana**

Agnivriddhi is followed by Doshapachana

**Srotas Shuddhi (Atipravritti )**

Atipravritti is hindere by resistance to irritant action of jayapala by snigdha guna of Nimbuk. It also promote Srotas Shuddhi through Kanthya and Hrudayshuddhikar properties of Nimbuk.

**Symptom Reduction**

Reduction in symptoms of jayapala toxicity occurs with the help of snigdha,ushna guna and amla rasa of jayapala. This results into antidotal action of jayapala.

**Probable Mode Of Action Of Peya in Sampraptivightana of Jaypal Toxicity**

- Agni Vriddhi
- Peya acts by enhancing Agni through Deepana and Pachana by Laghu guna and ushna virya.
- Agnivriddhi works for doshapachna.
- Vatanulomana qualities of Peya aids in clearing the channels due to ushna virya.
- Atisara shamana occurs with deepna and pachana followed by srotovaigunya shamana.
- Dhatukshya occurred by rechana and rktagamana is treted by dhtupushtikar guna of peya.
- This results as antidotal action of jayapala.

**Probable Mode Of Action Of Nimbuk Swarasa and Peya in Symptomatic Reduction of Jayapala Toxicity**

Table IX. Symptomtic Reduction of Jayapala Toxicity

| Symptoms | Properties | |
|---|---|---|
| | Nimbuk | Peya |
| **Shula, Chhardi, Rechana, Marana** | Shulaghna, Chhardighna, Jivhashodhana,Kanthashodhana by deepana, pachana and Tikshna guna and Amla Rasa | Deepana, Pachana , Atisaraghna and Vaatanulomana |
| **Hrullas** | Deepana, Pachana, Mukhashuddhikara | Laghu, Deepana, pachana |
| **Daha, Shonitagamana, Asyapaka** | Pittaghna | Vatanulomana, Dhatupushtikara |

**Mechanism of Action as per Modern Medicine View**

The toxalbumin present in the seeds is a toxic protein that disables ribosomes and inhibits protein synthesis. It is antigenic in nature, agglutinates red cells, and causes hemolysis and cell destruction. The mucous membrane of the stomach and intestines is usually found red, inflamed, and excoriated at places. Postmortem findings may reveal:

- Fragments of the seeds in the stomach and intestine.
- Congestion of the spleen and liver.
- Cloudy swelling and congestion of the kidneys.
- Occasionally, postmortem findings may be negative.

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**Nimbuk Swarasa Against Jayapala Seeds in Previous Studies**

In prior studies, a significant increase in SGPT levels was observed in the Jayapala-administered group compared to the control group, indicating possible liver damage or biliary duct problems. Elevated SGPT is associated with necrosis of hepatocytes or skeletal muscle cells, which correlates with raised SGOT levels. This elevation was notably reversed with the administration of Nimbuk Swarasa, suggesting its moderate antidotal effect against Jayapala poisoning.

The biochemical parameters and histopathological findings provide evidence of the antidotal potential of Nimbuk Swarasa against Jayapala-induced toxicity. Overall, results clearly indicate that Nimbuk Swarasa possesses effective antidotal properties against Jayapala toxicity.

Histopathological examination of colon and jejunum revealed moderate epithelial cell erosions in *Jayapala* seeds administered group, whereas *Nimbu swarasa* caused mild to moderate protection in a dose dependant manner. Sections of spleen showed remarkable increase in the proportion of white pulp in toxicant group, whereas the *Nimbu swarasa* at higher dose level showed marked decrease in the white pulp proportion. The hepatic sections of toxicant group displayed mild cell infiltration and fatty changes in the hepatocyte with mild diffused necrosis whereas the sections of co-administration of antidotes showed normal cytoarchitecture.[11]

Administration of Jayapala produced significant increase in faecal waterconfirming the watery stool formation enhancing effect of Jayapala. This effect was significantly reversed in the antidotal groups. Administration of Jayapala lead to significant decrease in food conversion ratio and significant reversal was observed in the antidotal groups. Hence, from the whole observations and from the above data, it is very clear that NimbuSwaras is an effective antidote against Jayapala induced toxicity.[12]

## V. CONCLUSION

In conclusion, the study highlights the therapeutic efficacy of Nimbuk Swarasa and Peya as effective antidotes against Jayapala toxicity, demonstrating their potential in enhancing digestive function, alleviating symptoms, and providing a cost-effective solution for managing this lesser toxic substance. The findings indicate that these preparations not only mitigate harmful effects but also embody a practical approach to addressing accidental poisoning.

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