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Role of amla rasa in the treatment of pandu (Nutritional anemia)

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Abstract
Introduction: Amla Rasa (sour taste), one among six Rasa and it been mentioned next to Madhura Rasa (sweet taste) on the basis of sequence of Bala (strength). Pandu (Anaemia) is the colour like that of pollen grains of Ketaki flower which is whitish yellow.
Objective: To critically analyse the role of Amla Rasa in Pandu Chikitsa (treatment).
Result: Amla Rasa Dravya predominantly have Amla Vipaka and Ushna Virya, they are Laghu and Kledha in nature, Pitta Slekshmakara and Vatahara. Pandu is a Pitta Pradhana Tridoshaja Vyadhi with the symptoms Rakta Kshaya and Ojo Kshaya. Shirira Dhwesha is the Vishesha Lakshana of the Vyadhi.
Discussion: Due to Jataragni Mandya Rasa Dhatwagni Kshaya will be seen hence, Rakta Dhatu will not getting the proper Poshana (nutrition) which further leads to Rakta Kshaya. Amalaki (Indian goose berry) and Dadima (pomegranate) are Amla Skanda Dravya which are widely used for the treatment of Pandu (Anaemia).
Conclusion: Amla Rasa which increase Jataragni at the same time mitigates Pitta should be the choice of drug in Pandu Chikitsa (nutritional anaemia).

Keywords: nutritional anemia, anaemia, amla rasa

Introduction
The one which is perceived through Rasanedriya is called as Rasa [1], they are six in number, namely Madhura (sweet), Amla (sour), Lavana (salt), Katu (pungent), Tikta (bitter) and Kashaya (astringent). In the described order of Rasa, Amla Rasa (sour taste) is mentioned next to Madhura Rasa (sweet taste) on the basis of sequence of Bala (strength) [2].
Pandu Roga (Anemia) is a disease described in Ayurveda since time immortal and the first reference being found in Vedas. In Rigveda and Atharvaveda, Pandu has been described by the name of Vilohita, Halima and Haribha. In Garuda Purana there is a description of using Takra (butter milk) mixed with Lauha Churna for the treatment of Pandu Roga. The reference of the disease is found in Mahabharathata also [3]. Pandu is the color like that of pollen grains of Ketaki flower which is whitish yellow [4] or White color mixed with yellowish tinge is called as Pandu [5].
Anaemia is derived from Greek word anaemia, where 'an' means without and 'haima' means blood. It denotes 'lack of blood'. Anaemia is defined as haemoglobin concentration in blood below the lower limit of normal range for the age and sex of the individual. Nutritional anaemia refers to anemia that can be directly attributed to nutritional disorders. Examples include Iron deficiency anemia and Pernicious anemia. According to WHO, a hemoglobin concentration below 7.5mmol/L and 8mmol/L for women and men respectively is considered to be anemic. Nutritional anaemia is caused by a lack of iron, protein, B12 and other vitamins and minerals that needed for the formation of hemoglobin. Folic acid deficiency is a common association of nutritional anemia and iron deficiency anaemia is the most common nutritional disorder [6].

Objective
To critically analyze the role of Amla rasa in Pandu Roga.

Result
Amla Rasa
Amla Rasa Dravya predominantly have Amla Vipaka and Ushna Virya, they are Laghu and Kledha in nature, Pitta Slekshmakara and Vatahara. In general, Amla Vipaka Dravya are Pitta Vardhaka, helps for evacuation of Purisha and Mutra and they are Sukra Nasaka [7].
Amla Rasa Utpatti- Pruthi and Agni Mahabhuta predominance [8] but according to Acharya Vagbhata Amla Rasa is originated from Jala and Agni Mahabhuta predominance [9].

Identification of Amla Rasa
Amla Rasa can be identified through the Lakshana's like watering of mouth, horripilation, tingling of the teeth and closure of eyes and eye brows [10].

Functions of Amla Rasa in the body
Functions of Amla Rasa according to different authors has been explained in table no 1,

Table 1: Functions of Amla Rasa

Sl No	Karma	Vagbhata [11]	Caraka [12]	Sushruta [13]
1	Agnideepana	+	+	+
2	Snigdha	+	+	-
3	Hrudhya	+	+	+
4	Pachana	+	+	+
5	Rochana	+	+	-
6	Prinana	+	-	-
7	Kledana	+	-	+
8	Kapha, Pitta and Rakta Dushti	+	-	-
9	Vatanulomana	+	+	+
10	Kosta Vidhahi	-	-	+
11	Bruhmana	-	+	-
12	Bala Vardhana	-	+	-

Amlarasa mainly act as Agnidipaka, Pachaka, Hrudhya and Vatanulomana and all Samhita have mentioned these properties. Acharya Caraka adds Bruhmana and Bala Vardhana property.

Amla Skhanda Varga

Amla Rasa oriented drugs are mentioned in a group called as Amla-rasa Skandha. Substances are mostly composed of many tastes, hence drugs primarily composed of Amlarasa or predominantly of Amla Vipaka or those which produce the effects similar to Amla rasa (Prabhava) are included under Amla Rasa Skandha.

Amla Skandha Dravya [14]

Phala of - Amra, Amrataka, Lakucha, Karamarda, Vrukshamla, Amlavetasa, Kuvala, Badara, Dadima, Matulunga, Gandira, Amalaka, Nanditaka, Shitaka, Tintidika, Dantasaka, Eravataka, Koshamra, Dhanvanaphala

Patra of - Amrataka, Ashmantaka, Changeri, four types of Amlika, two types of Shushka and Ama Kola Patra, Gramya and Vanya Amlika Patra.

Asava of- Sura, Souviraka, Tushodaka, Mairiya, Medaka, Madira,

Anya Dravya- Madhu, Shukta, Sidhu, Dadhi, Dadhimanda, Dhanyamla,

Chemical constituents of Amla Varga Dravya- commonly used

Amalaki (Indian goose berry) [15]

Hydrolysable Tannins Emblicanin A and B, Punigluconin, Pedunculagin, Chebulinic acid (Ellagitannin), Chebulagic acid (Benzopyran tannin), Corilagin (Ellagitannin), Geraniin (Dehydroellagitannin), Ellagotannin. Phenolic compounds are important antioxidant components of gooseberry fruits, with a total content of approx. 190 mg per 100 g of fm. fruits contain citric acid (11 to 14 mg per 100 g of fresh mass (fm)), malic acid (10 to 13 mg per 100 g of fm), and shikimic acid (1 to 2 mg per 100 g of fm).

Amra (mango) [16]

Fruit acidity of mango is attributed mainly to the content citric and malic acids, although other common organic acids from the tricarboxylic acid cycle have been reported in mango fruit including citric, oxalic, succinic, malic, and pyruvic as well as tartaric, muconic, galipic, glucuronic, and galacturonic acids; of these, citric is the major organic acid [0.13% to 0.71% fresh weight (FW)]

Amlavetasa [17]

The fruit juice of G. indica is very acidic with a pH 1.5 to 2.0 and contains large amounts of acids. Major portion of organic acids in kokum is hydroxycitric acid (HCA) (1, 2 dihydroxypropane-1, 2, 3-tricarboxylic acid). Rinds contain about 20-30% of (-)-HCA on dry basis. HCA is an anti-obesity agent, attributed with reduced food intake, increased energy expenditure, suppression of fatty acid synthesis and an enhancement of glycogen synthesis in liver.

Dadima [18]

The edible parts of pomegranate fruit (50%) comprised 40% arils (juice sacs) and 10% seeds. Arils contain 85% water, 10% total sugars (fructose and glucose), organic acid (ascorbic acid, citric acid, and malic acid), and bioactive compounds such as phenolics and flavonoids (anthocyanins). The chemical composition of the fruits differs depending on the cultivar, growing region, maturity, cultivation practice, climate, and storage circumstances. About 50% of the total fruit weight corresponds to the peel, which is an important source of bioactive compounds such as phenolics, flavonoids, ellagitannins, and proanthocyanidin compounds, minerals, mainly potassium, nitrogen, calcium, phosphorus, magnesium, and sodium, and complex polysaccharides. Arils contain 85% water, 10% total sugars, mainly fructose and glucose, and 1.5% pectin, organic acid, such as ascorbic acid, citric acid, and malic acid, and bioactive compounds such as phenolics and flavonoids, principally anthocyanins. PJ exhibits antioxidant activity that is much higher than that of red wine, green tea and other natural juices. The phytochemicals contained in PJ juice may protect haemoglobin from oxidizing agents [19].

Pandu Roga

Varna depend upon Satmyaja and Atmaja Bhava of Garbhotpatti. In a normal healthy individual, the normal skin color can be Gaura, Shyama, Avadata, Krishna Shyama and Krishna along with unctuousness and any Vaivarny is described as Pandu Roga.

Nidhana Panchaka [20]

Nidhana- Ati Amla Rasa Sevana etc,

Purvarupa- Hrudaya Swandana, Rukshata, Shrama, Aruchi, Mandagni

Rupa- Durbala, Mandagni, Shrama, Brama, Kopa, Hrudaya hravatva, Nidralu,

Upashaya- Ushna Dravya

Anupashaya- Shirira Dravya

Samprapti [21]

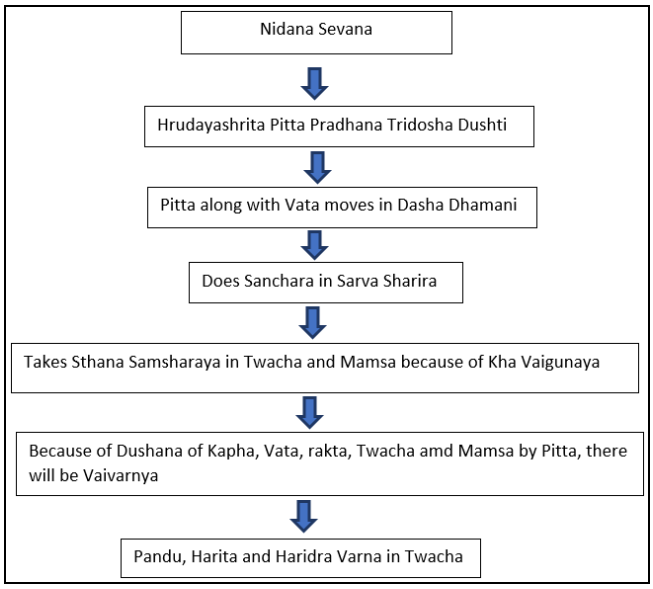

Fig 1

Samanya Chikitsa Sutra

Alpa Matra Dosha should be frequently eliminated by Shodhana, elimination of Atimatra Dosha leads to Upadrava like Shotha [22].

Discussion

Amla Rasa and Pitta has origin from same Yoni, because of which one aggravates the other. Pandu is a Pitta Prdhana Vyadhi, due to Ashraya Ashrayi Sambhanda, Pitta aggravates Rakta. Hence Amla rasa has direct impact on Rakta.

In Pandu Roga due to Jataragni Mandya, Rasa Dhatwagni Kshaya will be seen thus, Rakta Dhatu will not getting the proper Poshana, which further leads to Rakta Kshaya and then Ojo Kshaya. Amla Rasa takes origin from Agni Mahabhuta. Due to its similarity in Mahabhuta composition, all Amlarasa Dravya's believed to increase Pitta and there by does vitiation of Rakta. Amalaki and Dadima are Amla Skanda Dravya which are widely used for the treatment of Pandu. Along with Pandu, in other Pitta Pradhana Tridoshaja Vyadhi's like Jwara and Madhya Vikara also usage of Dadima is well established.

Some Dravya act either on the basis of their Rasa or Guna or Virya or Vipaka, but action of some Dravya do not belong to any of these categories. They are characterized by specific action known as Prabhava. Dadima and Amalaki has Madhura Vipaka and Sheeta virya, acts as Tridoshahara [23].

To under it further- chemical components of Amlaskandha Dravya mainly has Citric acid in it which makes it an important antioxidant. The presence of high amount of Citric acid might be the reason for Amla Rasa Dravya to vitiate Pitta. Still, Dadima and Amalaki are an exception to this. They are the richest source of hydrolysable tannins (HTs) and the significant pharmacological actions is mainly attributed to the presence of HTs present in it. Hydrolysable tannins are an important group of secondary plant metabolites that include simple gallic acid derivatives, gallotannis and ellagitannins. HTs exhibit anti-cancer, anti-angiogenic, antioxidant, anti-inflammatory and anti-ulcerative properties. Although citric fruits don't contain tannins, Amalaki and Dadima are exception where in Amalaki is rich in Ellagitannins and Gallotannins. Dadima is rich in ellagitannins and gallic acid. *In vitro* studies have showed that the Gallotannins in Amalaki when comes in connect with gastric acid gets hydrolysed and forms gallic acid, thereby is gets absorbed into gut. Thus, the absorption of Dadima and Amalaki becomes same in the gut and regular consumption of it may contribute to prevent stroke, cardiovascular heart disease and neurogenerative diseases.

The increased content of polyphenols in Dadima may prevent RBC destruction due to reduced oxidative stress. Indeed, this hypothesis is further supported by a study [24] reporting higher reduced GSH levels in erythrocytes following 500 ml PJ supplementation every day for two weeks. It was noted that this increase may be due to the induction of expression or the catalytic activity of enzymes involved in GSH biosynthesis that are known to be increased by plant polyphenols. Flavonoids serve an important role in preventing oxidation of haemoglobin by various factors, such as hypochlorous acid. Flavonoids bind to haemoglobin and are able to inhibit oxidation of the haemoglobin molecule by oxidizing agents. In addition to flavonoids, Pomegranate juice exhibits antioxidant activity that is much higher than that of red wine, green tea and other natural juices.

Conclusion

Due to Rasa Kshaya, Pandu Rogi will be having craving for Amla rasa but intake of Amla rasa due to its similarity in Yoni further aggravates Pitta. Hence, Amla rasa which mitigates Pitta at the same time increase jataragni should be the choice of drug in the treatment of Pandu.

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