



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research

Vol. 14, Issue, 03, pp. 65266-65272, March, 2024

<https://doi.org/10.37118/ijdr.27886.03.2024>



RESEARCH ARTICLE

OPEN ACCESS

CONCEPTUAL STUDY OF *PANDU ROGA* WITH SPECIAL REFERENCE TO ANAEMIA

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ARTICLE INFO

Article History:

Received 20th January, 2024

Received in revised form

26th January, 2024

Accepted 14th February, 2024

Published online 30th March, 2024

Key Words:

Anaemia, Pandu Roga, Ketaki Pushpa, Pregnant women, children.

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ABSTRACT

As the name indicates *Pandu* means "*Pandustu pibhagardhah ketaki dhulisannibah*" That means paleness is compared to pollen grains of *Ketaki* flower. Pallor is the paleness of skin and mucous membranes either as a result of diminished circulatory red blood cells or diminished blood supply. The word *Pandu* signifies all those diseases in which body colour becomes pale. In *Pandu Roga* deficiency of blood is the main symptom. Nowadays anaemia can be correlated with *Pandu Roga*. WHO estimates that 40 % of children 6-59 months of age, 37 % of pregnant women and 30% of women 15-49 years of age worldwide are anaemic [1]. In *Ayurvedic Samhitas*, many types of *Pandu Roga* have been given, and their treatment principle has been described by various *Acharyas*. *Acharya Charka* has described 5 types of *Pandu Roga* viz. *Vataja Pandu Roga*, *Pittaj Pandu Roga*, *Kaphaj pandu roga*, *Sannipataja Pandu roga*, *Mrittikabhakshanjanya Pandu Roga* or *Krimikoshthaj pandu Roga*. *Acharya Sushrut* described 4 types of *Pandu Roga* viz. *Vataja Pandu Roga*, *Pittaj Pandu Roga*, *Kaphaj pandu roga* and *Sannipataja Pandu roga*. *Acharya Vagbhatta* has given the same description of *Pandu Roga* as *Acharya Charaka*. *Acharya Harit* described 3 extra types of *Pandu Roga* i.e. *Kamla*, *Kumbhkamla* and *Halimaka* while *Acharya Sushrut* considered these synonyms of *Pandu Roga* According to *Acharyas Pitta Pradhan Tridosha* is the main causative factors.

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Citation: Dr. Gyaneshwar Bhai Patel, Dr. Manohar Ram, Dr. Ramnihor Tapsi Jaiswal and Dr. Sanjay Prakash, 2024. "Conceptual study of pandu roga with special reference to anaemia". International Journal of Development Research, 14, (03), 65266-65272.

INTRODUCTION

In Ayurveda many diseases have been described that in *Pandu Roga* is one of the most common diseases found worldwide. WHO estimates that 40 % of children 6-59 months of age, 37 % of pregnant women and 30% of women 15-49 years of age worldwide are anaemic. *Acharya Charak* has mentioned *Pandu Roga* after describing *Grahani dosha*, that means due to improper food habits like *Addhyasana*, *Samshana*, and *Vishamashana* and not following the rules of *Asthvidhaaharvisheshayatan* and *Dwadasaashan Pravicharana* as described by *Acharya Charak* and *Acharya Sushruta* respectively, leads to *Grahani dosha* that is malabsorption of food, which in turn develops *Pandu Roga*. A WHO expert group proposed that "anaemia or deficiency of blood should be considered to exist" when haemoglobin is below the following levels.[1]

Cut-off points for the diagnosis of Anaemia [2]

	Venous blood (g/dl)	MCHC (per cent)
Adult males	13	34
Adult females, non-pregnant	12	34
Adult females, pregnant	11	34
Children, 6 months to 6 years	11	34
Children, 6-14 years	12	34

At all ages the normal MCHC should be 34; values below that indicate that red cells are hypochromic, which occurs in iron deficiency anaemia. A haemoglobin level of 10 or 10-11 g/dl has been defined as early anaemia; a level below 10 g/dl is marked anaemia.

Rakta Dhatu: *Rakta Dhatu* is also called as *Rudhir*, *Lohita*, *Asrik*, *Kshataj*, *Shonit*. *Acharya Sushruta* has described *Rakta* as

ranjitatejasa tvapah sharirasthena dehinam | avyapannah prasannena raktamityabhidhiyate || (Su. Su. 14/5)

This Apya Rasa (Water-like-rasa) after getting red colour by the tejas (heat, fire-like agency) present in the body (in liver and spleen) remaining Un-vitiated) and clear, Comes to be called as Raktha (blood)

praninam pranah shonitam hyanuvartate||Ch. Su.24/4

According to *Acharya Charak* life of animals depends on *Rakta*[4].

Acharya Charak (Ch. Chi. 15/16) describes that origin of *Rakta* is from *Ras*.

Acharya Charak describes formation of *Rakta* from *Ras* is as below:

tejo rasanam sarvesham manujanam yaducyate | **pittoshmanah sa ragena raso raktatvamrrucchati**||Ch. Chi.15/28

In the body of Humans, *Tej* (*Prasad*) is part of *Aahar ras* and on colouring of *Aahar rasa* by the heat of *pitta* changes into *Rakta*. *Acharya Sushruta* also says that after digestion of *Aahar Rasa* which is *Apya Pradhan* changes into *Rakta* in *Yakrut* and *Pliha*. There are three important factors for the formation of *Rakta* i.e. *Tej of Aahar Ras*, *Ranjak Pitta* and *Raktagni* [4].

CHARACTERISTICS OF PURE BLOOD

madhuram lavanam kinjcidash Itoshnamasamhatam | **padmendragopahemavishashalohitalohitam lohitam prabhavah shuddham, tanostenaiva ca sthitih** | (A. Hi. Su. 27/1)

Acharya Vagbhatta described pure blood as sweet, having salt essence, even temperate, unscented (fluid) and having a colour similar to *Padma* (red lotus), *Indragop*, *Hem* (gold). It is said to be similar to the blood of *Avi* (sheep), *Shashak* (rabbit) Commentator *Hemadri* has interpreted the meaning of '*Hema*' as '*Manjishtha*'. It is a type of medicinal substance whose stem is blood coloured from the inside.[5]

tapanyendragopabham padmalaktakasannibham | **gunjjaphalasavarnam ca vishuddham viddhi shonitam**|| (Ch. Su.24/22)

Pure blood is considered to be *Tapaniya* (pure gold), having the aura of *Indragop*, red lotus and *Alaktak* and similar to the colour of *Gunjaphal*. It is red in colour. It is also known as '*Indrabadhu*' among the people.[4]

indragopakapratikashamasamhatamavivarnam ca prakrutistham janiyt || (Su. Su. 14/22)

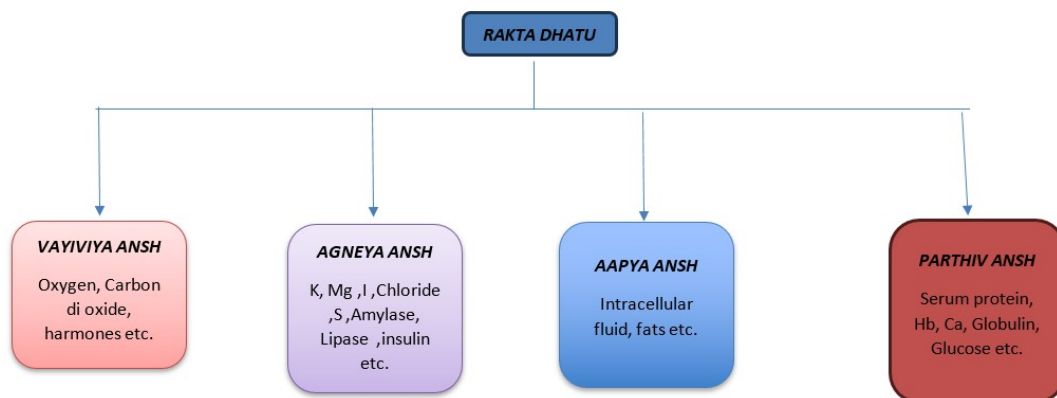
Acharya Sushruta has described red-complexioned, unmixed, colourless pure blood as that of *Indragop*. [3]

PANCHBHAUTIK COMPOSITION OF BLOOD

visrata dravata ragah spandanam laghuta tatha | **bhumyadinam guna hyete drushyante catra shonite** || (Su. Su. 14/9)

According to *Acharya Sushruta*, the *Visragandhi* property of *Rakta* is due to the *Prithvi Mahabhut*, the *Dravtva Guna* is due to *Jala Mahabhuta*, *Raaga* (redness) is due to *Agni Mahabhut*, *Spandana* is due to *Vayu Mahabhuta* and the *Laghuta* is due to *Akasha Mahabhut* [3].

According to the modern view, Blood can be correlated with *Rakta Dhatu* [6]



Blood: Blood is a connective tissue in fluid form. It is considered as the fluid of life because it carries oxygen from the lungs to all parts of the body and carbon dioxide from all parts of the body to the lungs. It is known as the fluid of growth because it carries nutritive substances from the digestive system and hormones from the endocrine gland to all the tissues. The blood is also called the fluid of health because it protects the body against diseases and gets rid of waste products and unwanted substances by transporting them to the excretory organs like kidneys [7].

Raktvaha Srotas:[3,4]

	Ch. Vi. 5/8	Su. Sh. 9/12
Srotas mula	Yakrut	Yakrut
	Pliha	Pliha
		Raktvahi Dhamaniya

Comparative chart of function of rakta dhatu in different samhitas

S.N.	Astangh hriday*	Astang Sangrah **	Sushrut Samhita***	Charak Samhita****
1.	Jeevanam	Jeevanam	Varnaprasadana, mamsa pusti, Jeevayati	Balavarnasukhayusha
2.		Jeevanam, Varnaprasadana, Mamsa poshana	Purana, varna, Sparshgyanam	Asrijah pittam

*A.H.Su.11/4** A.S.Su.1***Su.Su.(15/17,7/14) ****Ch.Su.(24/4),Ch.Chi.(15/18)

Characteristics of Raktasar Purush

karnakshimukhajihvanasaushthapanipadatalanakhhalalatamehanam snigdhakaravarnam shrimadbhrajishnu raktasaranam|sa sarata sukhmuddhatam medham manasvitvam saukumaryamanatibalamakleshahishnutvamushnasahishnutvam cacashte|| (Ch. Vi. 8/104)

The man whose ears, armpit, mouth, tongue, nose, lips, soles of feet, nails, forehead and penis are smooth, blood coloured, beautiful and shining is called *Raktasar Purusha*. This type of *Sarata* produces Happiness, arrogance, intelligence, sweetness, delicacy, infinite strength, inability to endure suffering, intolerance of heat etc.[4]

snigdhatamranakhanayanatalujihvaushthapanipadatalam raktena; I (Su. Su. 35/18)

Acharya Sushruta has said in the context of *Raktasar Purusha* that in whose nails, eyes, palate, tongue, lips and soles of the feet are smooth and copper (reddish,) should be considered *Raktasar Prusha*. [3]

Characteristics of Rakta Vriddhi:

raktam raktanggakshitam sirapurnatvam ca (Su. Su. 15/19)

According to *Acharya Sushruta* characteristics of *Rakta Vriddhi* are redness of eye and skin, fullness of blood vessels. (Su.Su.15/19)

Characteristics of Rakta Kshaya:

parusha sphutita mlana tvagruksha raktasangshaye I (Ch. Su.17/64)

when the blood is depleted, the skin become bittle, Gacked, faded and dry

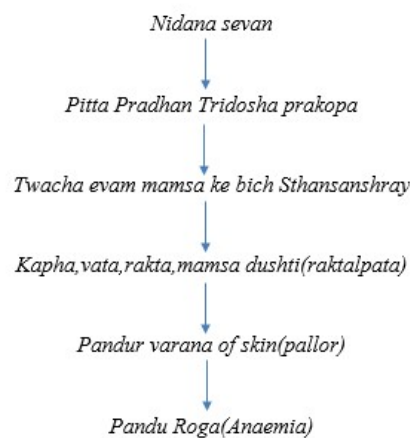
PANDU ROGA AND ANAEMIA

NIDANA:[8]

According to different *Samhitas* *Nidana* of *Pandu Roga* are divided into three groups:

Aaharaj Nidana	Viharaj Nidana	Nidanarthakar Roga
Excessive intake of <i>Amla</i> , <i>Lavana</i> , <i>Kshar</i> , <i>Ushna Aahar</i> , <i>Nishpav</i> , <i>urad</i> , <i>til tail</i> , alcohol, fishes, soil consumption, <i>pramitashana</i> , astringent food etc.	<i>Ativyaam</i> , <i>Divashayan</i> , <i>Atimaitun</i> , <i>Vega dharan</i> , <i>Vishamyoga of Panchkarma</i> , <i>Kama</i> , <i>Chinta</i> , Fear, Anger etc.	<i>Raktarsh</i> , <i>Raktapitta</i> , <i>shohta</i> , <i>udar roga</i> , <i>vishamjwar</i> , <i>grahani dosha</i> , <i>rakta pradar</i> , <i>rajyakshma</i> , <i>pittaj pratishyay</i> , <i>Gulma</i> , <i>Ashmari</i> , <i>Kamala</i> , <i>Prameha</i> etc.

Samprapti



PURVAROOPA (Ch.Chi.16/12, Su.U.44/5):[3,4]

Hridayspandan (Palpitation)
Rukshata (Dryness of skin)
Swedabhava (No sweating)
Shrama (Fatigue)
Twaksphota (Fissuring of skin)

Sthivan (Excessive salivation)
Gatrasada (Inertia of body)
Mridbhakshana (Desire to eat mud)
Akshikootashotha (Swelling around eyes)
Pita Mala mootra (yellowness of urine and stool)
Avipaka (Indigestion)

Types of Pandu Roga and its Roopa (symptoms): (Ch. Chi. 16/17 – 30, Su.U.44/7-9, Ma. Ni.8/7)

<i>Vataja Pandu Roga</i>	<i>Pittaja Pandu Roga</i>	<i>Kaphaja Pandu Roga</i>	<i>Sannipataja Pandu Roga</i>	<i>Mridbhakshanjanya Pandu</i>
<i>Krishanata</i>	<i>Pitata</i>	<i>Gaurav</i>	Mixed features of	<i>Balanash</i>
<i>Panduta</i>	<i>Haridrata</i>	<i>Tandra</i>	<i>Tridoshas</i> e.g. <i>Jwara</i> ,	<i>Varnanash</i>
<i>Rukshata</i>	<i>Jwara</i>	<i>Chardi</i>	<i>Arochaka</i>	<i>Agninash</i>
<i>Arunata</i>	<i>Daha</i>	<i>Swetata</i>	<i>Hrillasa</i>	<i>Akshikootashotha</i>
<i>Angmarda</i>	<i>Trishana</i>	<i>Praseka</i>	<i>Chardi</i>	<i>Ganda evum Bhru Pradesh me shoth</i>
<i>Ruja</i>	<i>Murcha</i>	<i>Lomaharsha</i>	<i>Trishna</i>	<i>Pada evum Nabhi me shotha</i>
<i>Toda</i>	<i>Mala-Mutra-Pita</i>	<i>Gatrasada</i>	<i>Klama</i> etc.	<i>Kosthakrimi</i>
<i>Kampa</i>	<i>Atisweda</i>	<i>Murcha</i>		<i>Rakta evum Kapha mishrita</i>
<i>Parshavashoola</i>	<i>Shitakamita</i>	<i>Bhrama</i>		<i>Rakta ka tyag</i>
<i>Shirashoola</i>	<i>Aruchi</i>	<i>Klama</i>		
<i>Shuska mala</i>	<i>Katukasyata</i>	<i>Swas</i>		
<i>Asya vairasya</i>	<i>Udgar</i>	<i>Kaas</i>		
<i>Shopha</i>	<i>Vidagdha Anna</i>	<i>Alasya</i>		
<i>Anaaha</i>	<i>Daurgandhya</i>	<i>Aruchi</i>		
<i>Balashaya</i>	<i>Tama</i>	<i>Vakswargraha</i>		
	<i>Bhinna Varcha</i>	<i>Malamutranetra Sweta</i>		
	<i>Shotha</i>	<i>Katu ruksha ushnakamita</i>		
	<i>Atisara</i>	<i>Shotha</i>		
		<i>Madhuarasyata</i>		

ANAEMIA: [9]

The functional classification of Anaemia has three major categories []

1. Marrow Production defects (Hypo proliferation)
2. Red Cell maturation defects (Ineffective erythropoiesis)
3. Decreased red cell survival (blood loss or Haemolysis)

Hypo-proliferative anaemia is typically seen with a reticulocyte production index together with little or no change in cell morphology (normocytic and normochromic anaemia). In general hypo-proliferative anaemias are characterized by normocytic, normochromic red cells, although microcytic hypochromic cells may be observed with mild iron deficiency or long-standing chronic inflammatory diseases. Maturation disorders typically have a slight to moderately elevated reticulocyte production that is accompanied by either macrocytic or microcytic red cell indices. The presence of anaemia with an inappropriately low reticulocyte production index, macro: or microcytosis on smear, and abnormal red cell indices suggest a maturation disorder.

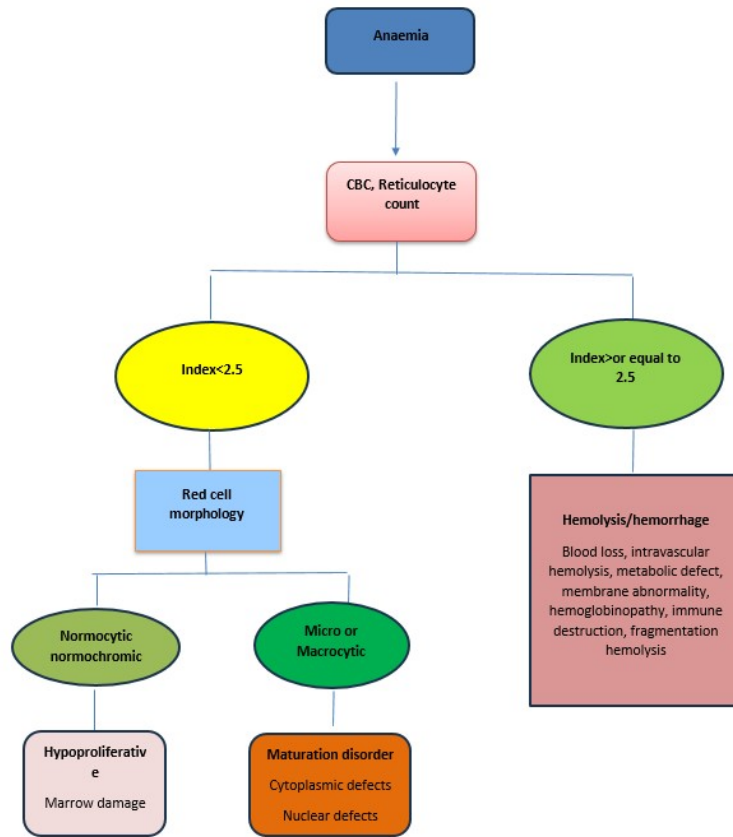
Maturation disorders are divided into two categories: nuclear maturation defects, associated with macrocytosis and cytoplasmic maturation defects, associated with microcytosis and Hypochromia usually from Haemoglobin synthesis. Nuclear maturation defects result from vitamin B12 or Folic acid deficiency, drug damage, or Myelodysplasia. Cytoplasmic maturation defects result from severe iron deficiency or abnormalities in globin or heme synthesis. Increased red cell destruction secondary to hemolysis results in an increase in the reticulocyte production index to at least three times normal, provided sufficient iron is available. In contrast to anaemia associated with an inappropriately low reticulocyte production index, hemolysis is associated with red cell production indices > or equal to 2.5 times normal.

Anaemia from chronic blood loss presents more often as iron deficiency than with the picture of increased red cell production. Haemolytic disease while dramatic, is among the least common form of anaemias. The ability to sustain a high reticulocyte production index reflects the ability of the erythroid marrow to compensate for hemolysis and, in the case of extravascular hemolysis, the efficient recycling of iron from the destroyed red cells to support red cell production. Haemorrhagic anaemia does not typically result in production indices of more than 2.0-2.5 times normal because of the limitations placed on the expansion of the erythroid marrow by iron availability.

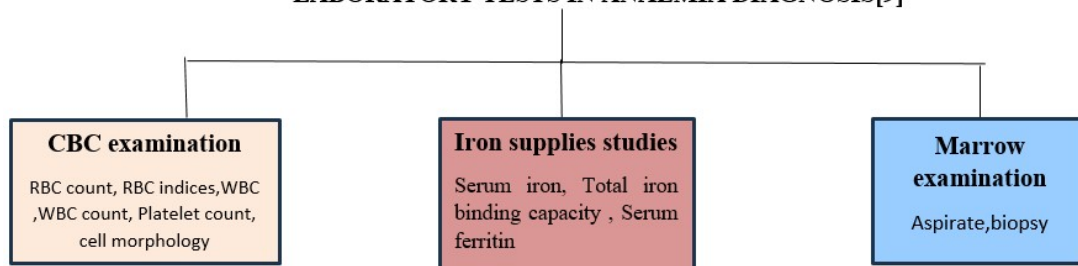
Clinical Presentation of Anaemia

Anaemia is most often recognized by abnormal screening laboratory tests. Patients less commonly present with advanced anaemia and its attendant signs and symptoms. Acute anaemia is due to blood loss or Hemolysis. If blood loss is mild, enhanced oxygen delivery is achieved through changes in the oxygen haemoglobin dissociation curve mediated by decreased pH or increased Carbon dioxide (*Bohr effect*). With acute blood loss, Hypovolemia dominated the clinical picture, and the haematocrit and haemoglobin levels do not reflect the volume of blood lost. Signs of vascular instability appear with acute losses of 10-15 % of the total blood volume. In such patients, the tissue is not anaemia but hypotension and decreased organ perfusion. When > 30% of the blood volume is lost suddenly, patients are unable to compensate with the usual mechanisms of vascular constriction and changes in regional blood flow. The patient prefers to remain supine and will show postural hypotension and tachycardia. If the Volume of blood loss is >40%(i.e. > 2L in the average-sized adult), signs of hypovolemic shock including confusion, dyspnoea, diaphoresis, hypotension and Tachycardia appear. Such patients have significant vital organ perfusion and require immediate volume replacement.

The Physiological classification of anaemia [9]



LABORATORY TESTS IN ANAEMIA DIAGNOSIS[9]



Sadhyasadyata [8]

Ashadhyia Lakshana: *Chirotpannah* (chronic anaemia), *kharibhutata* (tissue damage), *Shothadhikya*(Oedema), *pitani pashyati* (yellow vision), *baddhaalpvida*(Constipation), *Sakaphaharit atisar*(Diarrhoea-Greenish mucoid), *Chhardi*(Vomiting), *Murchha*(Fainting), *Trishna*(Excessive thirst), *Pandu varna* of teeth, eyes and nails, *Pandusanghatdarshi*, swelling of hand, foot and head, oedema in anus, penis and testis sacs.

Upadrava (Su./U.44/ 15,38): *Aruchii*(Anorexia), *Pipasaadhikya*(Excessive thirst), *Chhardi*(Vomiting), *Jwar*(Fever), *Shirhashoola* (Headache), *Agnimandya* (Indigestion), *Shosa*(Emaciation), *Murchha*(Fainting), *Klama*(Malaise), *Hridpira*(Cardiac Pain), *Shwas*(Exertional dyspnoea), *Atisar* (Diarrhoea), *Kasa*(Cough), *Daha*(Burning Sensation), *Swarbheda*(Hoarseness of voice).

Chikitsa Sutra [8]

1. Nidan parivarjana
2. Samshodhan chikitsa: a)Nidan Parivarjan
b)Abhyantar snehan
c) Tikshna samshodhan
d)Rakta Basti

tatra pandvamayi snigdhashtikshnairurdhvanulomikaih | samshodhyo mrudubhistiktaih kamalI tu virecanaih | (Ch. Chi. 16/40)

1. Samshaman chikitsa

vatike snehabhuyishtham, paittike tiktashitalam | shlaishmike katutiktoshnam , vimishram snnipatike | nipatayecchar Irattu mruttikam bhakshitam bhishak | yuktijnjah shodhanaistikshnaih prasamikshya balabalam | shuddhakayasya sarpimshi baladhanani yojayet | (Ch. Chi. 16/116-118)

PANDU ROGA	CHIKITSA
Vataja Pandu	Abhyantar snehana
Pittaja Pandu	Tikta rasa and Shita virya Aushdha
Kaphaja Pandu	Katu-Tikta Rasa and Ushna Virya aushdha
Sannipataja pandu	Mishrit Chikitsa
Mridbhakshanjanya pandu	Nidan Parivarjan, Krimi upchar, Balya ghrita
All Pandu Roga	Pathya anna sevan

CHIKITSA KRAMA

In Pandu patients, we should follow the following Chikitsa Krama:

(A) Samshodhan Chikitsa

- Abhyantar Snehan** -Especially in Vataj Pandu, dose 10-20ml, Anupana- Ushnodak. Panchgavya Ghrita, Mahatikta Ghrita, Kalayanak Ghrita, Dadim Ghrita, Haridradi Ghrita, Pathya Ghrita, Danti Ghrita, Draksha Ghrita, Katukadya Ghrita etc.
- Tikshna Vamana** – especially in Mridbhakshan janya Pandu. In Kaphaj Pandu vaman is done with katu- tikta rasa and ushna virya drugs e.g. Dhamargav Kalpa.
- Tikshna Virechana** - Especially in Pittaj Pandu. With Gomutra and Milk and only Milk, Haritaki churna, Pathya ghrita, Nishotha churna and Sharkara.
- Rakta Basti** – Aja rakta Basti

(B) Shanshaman Chikitsa

- Rasa Bhasma, Loh Mandur:** Dose 125mg-250mg, Anupana- Madhu, Ghrita, takra Punarnava Mandur, Nvayas loha, Swarna makshika Bhasma, Dhtri loha, Yograj, Shuddha mandur Bhasma, Loha Bhasma, shankha Bhasma etc.
- Vati/Vatak:** dose 250-500 mg, Anupana – Madhu, Ghrita, takra Arogyvrhdhani vati, Mandur vatak, Abhaya Vati, takra Vati
- Churna:** dose 2-6gms, anupana – Ushnodak, Madhu Triphala Churna, amalaki churna
- Kwath:** dose 20-40 ml, Anupana – Madhu, Jala Phaltrikadi kwath, Punarnavashtak Kwath
- Asav/arishta:** dose 20-40 ml, Anupana – water Lohasava, Kumaryasava, Punarnavarishta, Drakshasava, Vidangarishta
- Avaleh :** dose – 10-20 gms, Anupanaa- milk, Jala Dhatriavaleha, Drakshavaleha
- Ghrita:** dose 10-20ml. Anupana – Milk, Ushnodaka Mahatikta Ghrita, Kalyanak, Triphala Ghrita.
- Rasayana:** dose – According to Patient and disease Yograj Rasayan, Triphala rasayan, Amalaki Rasayana, shilajatu Rasayana, Loha Rasayana, Chyavanprash, Mandur Rasayana
- Kalpa Chikitsa:** Loha Parpati, Vijay Parpati

PATHYA AHAAR	PATHYA VIHAAR	APATHYA AHAAR	APATHYA VIHAR
Yava, Shali Chawal, Moong, Masoor, Kushmanda, Patola, Jangal mansrasa, Gomutra, Haridra, Madhu, ghrita, takra, Haritaki, Shunthi, Amalaki, Palak, Chaulai, Methi, Carrot, banana, Garlic etc.	Being happy, Mridu virechana	Masha, sem, Til, Hingu, Tambul, Sarso, Sura, lavan, amla, Matsya, ati jala pana	Atapa sevan, Maithun Karma, divashayan, Vyayam, Vega dharana, chinta, Krodha etc.

Treatment of Anaemia [10]

IRON DEFICIENCY ANAEMIA	MEGALOBlastic ANAEMIA	PERNICIOUS ANAEMIA
Treatment of the cause, Green leafy vegetables, nuts, dates, custard apples, meat, liver ORAL: Preparations – Fe sulphate 200mg(60mg elemental) Fe gluconate 300 mg, Fe fumerate 200mg PARENTAL: for I.m. Iron dextran, Iron sorbitol citrate, iron carbohydrate complex. For I.V. (in 5% dextrose or normal saline) iron dextran, iron gluconate	1. Treatment of B12 deficiency a) Diet: Non-vegetarian food, dairy products b) Replacement therapy: 1000 micrograms, B12 I.M., Once a week for 8 weeks, >1000 micrograms B12 I.M. once a month for life. 2. Treatment of folic acid deficiency: a) green leafy vegetables, nuts, liver b) Replacement therapy: 5mg per day for 2-4 months c) Folinic acid 100-200 mg per day used in patients on treatment with methotrexate or trimethoprim 3. Treatment of cause 4. packed cell transfusion: given in cases of severe anaemia.	Treatment is lifelong Vit B12 replacement therapy, Glucocorticoides may be helpful.

CONCLUSION

Pandu Roga is one of the most common diseases worldwide, WHO estimates that 40 % of children 6-59 months of age, 37 % of pregnant women and 30% of women 15-49 years of age worldwide are anaemic. Acharya Charaka has described the Pandu Roga in Chikitsa Sthana after Grahani Dosh because the causes of Pandu roga are the same as Grahani Dosh. Pandu Roga is of 5 types according to Acharya Charaka and Acharya Sushruta has described 4 types of Pandu roga. Kamla, halimaka and panaki is considered as other types of pandu roga by other Acharyas. Acharya Charka has described Pandu Roga in one Chapter. Signs and symptoms are according to the doshas involved in them. The functional classification of anaemia has three major categories: 1. Marrow production defects 2. Red cell maturation defects 3. Decreased red cell survival. Treatment principles involve Nidan Parivarjana, samshodhan chikitsa, and Shanshaman Chikitsa according to Ayurveda along with the

proper *ahaar* and *vihara*. According to the modern view treatment principles are; symptomatic, blood transfusion, according to cause, plasma expander, haematinic drugs, haemopoietic drugs, and nourishing diet.

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