CRITICAL ANALYSIS OF BLOOD INDICES AND HAEMOGLOBIN WITH RESPECT TO *PANDU ROGA-* AN OBSERVATIONAL PILOT STUDY

THORAT KP[1], KHANDARE S[*2] AND KULLOLLI V[3]

1: Associate Professor & PhD Scholar, Dept. of Roga Nidana, Parul Institute of Ayurved and Research, Parul University

2: Professor, Dept. of Shalya Tantra, Parul Institute of Ayurved, Parul University

3: Professor & Guide PhD, Dept. of Roga Nidana, Parul Institute of Ayurved, Parul University

*Corresponding Author: Dr. Sunil Khandare: E Mail: sunil.khandare260000@paruluniversity.ac.in

ABSTRACT

Panduroga is an illness that can be the nearest comparison with Anaemia, is often found in Asian subcontinent, most of the time due to Nutritional deficiency. Even though the incidence of the sickness is in both genders, however females are majorly affected. World Health Organization statistics show that the developing countries have got per capita income of their population below poverty line. They cannot afford fresh, green foliate vegetables, cereals, milk, fruit's etc. Even most women couldn't get proper nutrient food throughout their physiological state and after-ward because of illiteracy, poorness and lack of proper understanding regarding sickness. Even though they suffer with the fatigue and lack of enthusiasm, they cannot correlate their conditions to the under lying cause of anaemia. Rather most of the population with the undiagnosed Anaemia will be living as "Walking Well" as quoted by Dr. Steve Gundray[1]. Other than clinical presentations and complaints, most dependable criteria for the diagnosis of the Anemia is the Complete Blood Count (CBC). But whether the clinical features of Pandu match with the results of the Complete Blood count? Is the question of this study. So, an observational pilot study was taken up to evaluate and analyze the correlation between the classical features of Pandu Roga and the results found in the hematological test of CBC. The results are interesting and surprising.

Keywords: *Pandu*, Anemia, Ayurveda, Blood Indices, Complete Blood Count

INTRODUCTION:

Anemia is defined because the qualitative or quantitative diminution of red blood cell and /or hemoprotein concentration to hold adequate chemical element to the body's tissue in respect to normal age and sex and is clinically manifested by pallor. The clinical condition of anemia particularly iron deficiency anemia is often correlated with *Pandu* Roga in writing. it's mentioned all told *Ayurvedic* texts like *Charka Samhita, Susruta Samhita, Astanga Hrudaya* etc. *Rasavaha* and *Raktavaha Srotas* are chiefly concerned in pathological process of *Pandu Roga*. The *Anna-rasa* (the essence of the food) nourishes all *Dhatus* (tissues) whereas the *Kitta-bhag* (waste product of the digestion) is excreted out. The *Anna-rasa* is created by the action of *Jatharagni* (digestive juices) on *Ahara* (food). Once there's hypo functioning of *Jatharagni*, that turn out improper *Anna-rasa* and it ends up in the formation of abnormal *Rasa Dhatu* and can consequently turn out abnormal and deficient *Rakta Dhatu* (Blood Tissue) so, the deficient of Rakta Dhatu ensuing symptoms square measure seem like *Pandu varna,* (pallor), *Rakta Alpata* (quantitative decrease in the blood components)*, Durbalata* (weakness), etc. during this series, ultimately there's diminution of the very important essence i.e.,

Ojas. As a result of above, the individual becomes *Nissara* (insipid) and *Pandu* is created. General principles of the diagnosis of the *Pandu roga* are as mentioned in the classical books of the Ayurveda. But, comparing the Pandu Roga with the Anaemia, most of the time *Pandu roga* are casually diagnosed based on the hematological results of the patients, comprising of Hemoglobin percentage, total RBC count and Blood Indices and accordingly the Ayurvedic treatment is administered. So, this study was planned to evaluate the authenticity of such approach of diagnosis of Pandu roga based on CBC and its outcome.

MATERIAL & METHODS:

An observational Pilot study with the sample size of 15 patients with varied complaints registered for this study on the incidental finding of sub normal hemoglobin percentage and with or without altered values of the blood indices, included from the Parul Ayurveda Hospital, Limda, Vadodara.

Literary Study was done with all the Ayurvedic classics like *Brihattrayee* (texts of *Charaka, Sushruta, Vagbhata), Laghutrayi* (texts of *Madhavakara, Sharangadhara* and *Bhavamishra)* and modern medicine texts were referred.

Diagnostic and Inclusion criteria:

1. Patients with either Hemoglobin percentage less than 11gm/dl or with classical clinical features of Pandu.

2. Patients within the age group of 18 years to 60 years.

3. Patients of either gender.

Exclusion Criteria:

1. Patients with chronic diseases like Tuberculosis, Malignancy, Renal Failure and hepatic diseases.

2. Females in their pregnancy and lactating period.

3. Patients less than 18 years and more than 60 years.

Study Design:

Screening was done with a checklist comprising of clinical features of Pandu Roga as well as with the Complete Blood Count report to include the patients in this study. The below shown screening form was used retrospectively to analyze the *Pandu lakshana* in the patients with hemoglobin percentage less than 11gm/ dl.

AN OBSERVATIONAL STUDY OF TYPES OF PANDU ROGA WITH SPECIAL REFERENCE TO BLOOD INDICES

Screening form

Patient name:	Age: .... yeasrs	Gender : male/female
Date:	Opd no:	Ipd no:

Sr. No.	Complaints (signs and symptoms)	Yes/ No	Remark
01	Panduta in twak (skin pallor)		
02	Panduta in nakha (Nail Pallor)		
03	Panduta in mukha(Pale oral mucosa)		
04	Panduta in netra (pale conjunctiva)		
05	Panduta in jiva (pale tongue)		
06	Panduta in hastapadatala (pale sloes & palm)		
07	Shunaakshikutha Shotha (peri orbital oedema)		
08	Dourbalyata (weakness)		
09	Hridspandana (palpitations)		
10	Bhrama (giddiness)		
11	Rukshata (dryness)		
12	Jwara (fever)		
13	Aruchi (tastelessness)		
14	Karnakshweda (tinnitus)		
15	Ayasenshwasa (exertional dyspnoea)		
16	Gauravata (heaviness)		
17	Nidra (sleep disturbances)		
18	Sadana (malaise)		
19	Trishna (excessive thirst)		

Hematological Tests used were: Complete Blood Count comprising of Hemoglobin Percentage (Hb), Total RBC, Blood indices that are Packed Cell Volume (P.C.V), Mean Cell Volume (M.C.V), Mean Cell Hemoglobin (M.C.H), Mean Cell Hemoglobin Concentration (M.C.H.C) and Reticulocyte count (R.D.W)

Assessment Criteria: Both the results of the screening form and the hematological tests were compared to draw a conclusion about the relationship of Complete Blood Count and the *Pandu Roga* classical features.

Review of *Pandu Vyadhi*

Pandu Roga has been subdivided into 5 sub types on the basis of *Doshik*

predominance and etiology as V*atika Pandu (Vata* predominant), *Paittika Pandu (Pitta* predominant), *Kaphaja Pandu (Kapha* predominant), *Tridoshaja Pandu* (all the three *Doshas* dominant) and *Mrittika Bhakshan Janya Pandu* (due to mud consumption). Specific clinical features of each have been described in very detail. *Ayurveda* explains that the diseases have to be categorized for the purpose of treatment on the basis of features of *Doshik* predominance (*Dosholbanata*) by observing the clinical features[2].

Clinical Feature of *Pandu* according to modern view[3]:

VATIKA PANDU FEATURES	PAITTIKA PANDU FEATURES	KAPHAJA PANDU FEATURES
Krishna Pandutvam –Blackishness in skin	*Sah Peeto* – Yellowish discoloration of skin	*Shwetaavabhasatam*- Whitishness in the body
Ruksha Angatam – Dryness of body	*Haritabho varna*- greenish Discoloration	*Shukla sira avanadham*- Visible pale veins
Aruna Angatam –reddishdiscoloration	*Peeta sira avanadham*-Visible, yellowish veins	*Shukla nakha* – whitish nails
Krishna sira avanadham –Visible Blackish Veins	*Peeta nakha* – yellowish nails	*Shukla anana* – whitishness in the face
Aruna Siratva – Visible Reddish veins	*Peeta anana* – yellowish Ness in the Face	*Shukla Netra* – whitishness in the eyes
Krishna nakha – Blackish nails	*Peeta Netra* – yellowish Ness in the Eyes	*Shukla mutra*- whitishness in urine
Aruna nakha – Reddish nails	*Peeta mutra*-colored urine – Yellowish	*Shukla varchastvam*–Whitishness in stools
Krishna anana –Blackishness in the face	*Peeta shakrit* – Yellowish colored Stool	*Madhur aasyatvam* – Sweet taste in the mouth.
Aruna netrata –Reddishness in the eyes	*Daurgandhyam Varcha*–Foul smelling stools	*Aruchi* – Anorexia
Krishna akshadam –blackishness in the eyes	*Bhina Varchastvam* – loose stools	*Gaurav* – Heaviness
Krishna mutra – Blackish urine	*Katuka aasyo* - pungent taste in Mouth	*Praseka* – Excess salivation

Krishna mala – blackish stool	*Anna anabhinandan* – Does not relish food.	*Alasya* – Laziness
Varcha shosha – Dryness of stools	*Amlodgara* eructation– sour	*Chardi* – Vomitting
Aasya Vairasya – Distaste in mouth	*Vidagdhe anne chasya jayte* - Improper digestion of food	*Tandra* – Drowsiness
Anaha – abdominal distension	*Udgaro Vidahashcha*- eructation associated with burning sensation	*Loma harsha* – Horripilation
Anga marda – Pain in the body	*Daha* –Burning sensation	*Klama* – Mental fatigue
Ruja – Pain / ache	*Jvara* – having increased body temp.	*Murcha*- fainting
Toda – Pricking pain	*Trishna* – Excessive thirst	*Saad* – Prostration
Kampa – Tremor	*Murcha Pipasartah* – Faints due to excessive thirst / coma	*Vak swara graham*- Inability to speak
Shiro ruja – Headache	*Swedanah* sweating – Profuse	*Kasa* – Cough
Bala kshaya – weakness	*Daurbalyam* – Weakness	*Shwasa* – Dyspnoea
Parshva ruja- Pain in the sides of chest	*Tamah* – Feeling of darkness in front of eyes	*Shwayathum* – Oedema

Vataja Pandu:

Due to consumption of *Vata Prakopaka* diet and activities leads to aggravation of *Vata* and manifest *Vataja Pandu Roga*, produces *Lakshana* (features) like *RukshaAnga, Angamarda, Toda, Kampa, Parshavruja, Shiroruja, Varchashosha, Mukha Vairasya, Shopha, Anaha, BalaKshay*[4].

Pittaja Pandu:

Pitta is already disturbed in *Pandu* Roga, in such circumstances if patients consume *Pitta* aggravating *Ahara* and *Vihara* and having *Pitta* Prakriti then *Pitta* exacerbates. Due to intake of Nidana, *Pitta* aggravates in excess and brings abnormality in *Rakta* and manifest *Pitta*ja *Pandu Roga*. *Lakshana* (features) – *Peeta Harita Varna, Jwara Daha, Trushna, Murccha, Pipasa, Pita Mutra, Svedanaha Sheeta Kamita, Annam Abhinandati,* *KatukaAasya, Amla Udgara, Vidaha, Mukha Daurgandhya, Bhinna Varchas, Daurbalyama*[5]

Kaphaja Pandu:

Kaphaja Pandu is a type of *Pandu* where *Lakshana* of *Kapha Dosha* is predominant. *Pandu* is a *Pitta Pradhana Vyadhi*, in all types of *Pandu Pitta Dosha* is involved and it is the main contributing factor in *Samprapti* of *Pandu*, but according to symptoms of disease it is further divided into *Vataja, Pitta*ja, *Kaphaja, Sannipataja* and *Mridbhaksahana Janya Pandu*. In case of *Kaphaja Pandu*, with *Pitta, Kapha Dosha* also gets involved in producing this particular condition. Here along with '*Pandu* Bhava' the symptoms like *Tandra, Alasya, Gaurava, Praseka, Sweta Varnata* of *Twak, Mukha* and *Mutra* are seen which indicates *Kapha*dushti[6].

Mrittika Bhakshana Janya Pandu-

Mrittika Bhakshana Janya Pandu (*Pandu* because of eating of mud) *Shuna Ganda, Akshikuta, Bhru* (Swelling within the cheeks, eyelids and eye brows) *Shuna Pannabhimehanah* (Swelling within the feet, umbilical region and genitals) *Krimikoshtha* (worm infestation) *Atisara* (Loose motions) *Saasruk Kaphanvitam* (Stool being associated with bloodand mucus).

According to modern sciences pica is not a cause of iron deficiency anemia; pica is a symptom of iron deficiency anemia. It is the link between iron deficiency anemia and lead poisoning, which is why iron deficiency anemia should always be sought when a child is diagnosed with lead poisoning. Hippocrates recognized clay eating; however, modern physicians often do not recognize it unless the patient and family are specifically queried. Both substances decrease the absorption of dietary iron.

Tridoshaja Pandu

Signs and symptoms of vitiation of all the three *Doshas* will be seen.

RESULT & DISCUSSION:

All the selected 15 patients were subjected for the screening with the screening form as mentioned above and evaluated retrospectively with their CBC report that is summarized as in below table:

S. No	Patient registration Number	Age/ Gender	HB% Gm/dl	Total RBC Count Million /cumm	P.C.V %	M.C.V Femto litre	M.C.H pg	M.C.H.C Gm/dl	R.D.W %
01	22002241	19/F	9.0	4.19	26.9	64.2	21.48	33.5	18.2
02	21027665	21/F	9.8	4.06	28.1	69.12	24.14	34.9	17.6
03	22001766	27/F	7.4	3.97	21.8	54.91	18.64	33.9	18.3
04	22001909	24/F	10.7	4.55	31.2	68.57	23.52	34.3	18.0
05	21026772	22/F	7.8	3.74	23.4	62.57	20.86	33.3	19.2
06	22002283	21/F	10.9	4.63	30.8	66.52	23.54	35.4	15.9
07	21026355	23/F	10.4	3.67	29.4	80.11	28.34	35.4	16.0
08	21025885	50/F	10.4	3.99	29.8	74.69	26.07	34.9	16.4
09	22001976	37/ M	8.8	2.51	23.7	94.42	35.06	37.1	17.9
10	22002277	22/F	10.1	4.17	29.3	70.26	24.22	34.5	17.6
11	22002282	22/F	10.5	4.05	29.8	73.58	25.93	35.2	17.0
12	22002148	22/F	10.8	4.00	31.0	77.5	27	34.8	16.4
13	22002264	19/F	9.4	3.63	26.7	73.55	25.9	35.2	19.1
14	22001459	28/ F	9.4	3.78	27.4	72.49	24.87	34.3	16.5
15	22002170	27/F	10.4	4.18	29.5	70.57	24.88	35.3	15.6

NOTE: The normal range being considered as 1. Hb: Female 12 gm/dl or higher and Male 13 gm/dl or higher; 2. RBC count: 4.7 – 6.0 million cells/ cubic millimeter; 3. P.C.V: 42-52%; 4. M.C.V: 78-100 femtolitre; 5. M.C.H: 27-31 pg; 6. M.C.H.C: 32-36 gm/dl; 7. R.D.W: 11.5-14.0/ cubic millimeter.

Anaemia is defined as a Hemoglobin (Hb) concentration in the blood that is below the expected value, when age, gender, pregnancy and certain environmental factors, such as altitude, are taken into account (WHO 2001).

In this observational study, most of the (86.66%) subject were young adults from

the tropical area of lower altitude and females with a mean Hb of 9.72gm/dl; mean RBC count 3.94 million cells/ cubic millimeter; mean PCV 27.92%; Mean MCV 71.53 femtolitre; mean MCH 24.96 pg; mean MCHC 34.8 gm/dl and mean RDW 17.31/ cmm.

Interestingly most of the patients did not show the typical anaemia signs and symptoms, Moreover, as per the medical records, anaemia is not a disease per se. it is a clinical feature of other conditions such as Hemorrhage, chronic renal disease or infection, liver disease or dietary deficiency.[7] In all the included subjects, none of the above conditions were noted except attributing their low Hb to their dietary habit, which is most of the time with nutritional deficiency as per their claim and looking into their daily food.

The results revealing reduced RBC count along with the reduced P.C.V without any obvious serious conditions like hemorrhage or any chronic disease leading to the blood cell destruction in the subjects, can be attributed to as the reduced production of the red blood cells. Further it is supported by the results of the M.C.V, that there existed the microcytosis, indicating the nutritional deficiency. Twelve individuals (80%) shown the reduced M.C.H amounting to hypochromic anaemia secondary to Iron deficiency in their diet.

Majority of the patients that were reported to different out patient departments of Parul Ayurved Hospital, Vadodara, was for their Myopia conditions and rest of the patient for their body ache and joint pains. None of them had even the provisional clinical diagnosis of Anaemia, when they reported to OPD. Their decreased CBC were incidental findings. Based on their CBC report when retrogradely they were evaluated with the classical *Pandu roga laxanas*, most of them even did not show many of the features except as below;

Summary of the observed features of registered subjects with respect to *Panduroga laxana*

Sr. No.	Complaints (signs and symptoms)	Total Number of subjects presented with (out of 15 subjects)	Remark
01	Panduta in twak (skin pallor)	02	Subjects with Hb <8gm/dl
02	Panduta in nakha (Nail Pallor)	02	Subjects with Hb <8gm/dl
03	Panduta in mukha(Pale oral mucosa)	02	Subjects with Hb <8gm/dl
04	Panduta in netra (pale conjunctiva)	15	Clinically appreciable
05	Panduta in jiva (pale tongue)	03	Pale pink clinically
06	Panduta in hastapadatala (pale sloes & palm)	03	Subjects with Hb <8gm/dl
07	Shunaakshikutha Shotha (peri orbital	00	None of them found with

	oedema)		oedema
08	**Dourbalyata (weakness)**	07	**Subjects with Hb <10gm/dl**
09	**Hridspandana (palpitations)**	02	**Subjects with Hb <8gm/dl**
10	**Bhrama (giddiness)**	03	**Subjects with Hb <9gm/dl**
11	**Rukshata (dryness)**	11	**Subjects with Hb <10.5 gm/dl**
12	**Jwara (fever)**	00	**None**
13	**Aruchi (tastelessness)**	02	**Subjects with Hb <8gm/dl**
14	**Karnakshweda (tinnitus)**	00	**none**
15	**Ayasenshwasa (exertional dyspnoea)**	00	**none**
16	**Gauravata (heaviness)**	05	**Irrespective to the HB%**
17	**Nidra (sleep disturbances)**	02	**Subjects with Hb <8gm/dl**
18	**Sadana (malaise)**	03	**Irrespective to the HB%**
19	**Trishna (excessive thirst)**	02	**Irrespective to the HB%**

Only two subjects reflected the hallmark of Pandu varna in their Twak, Nakha and Mukha, but interestingly, conjunctival pallor was obvious with all the 15 subjects. This can be taken as the conjunctiva is more sensitive indicator for even mild decrease in the hemoglobin percentage. To appreciate *Pandu Varna* (Pallor) in the Nakha (Nails), Mucosa, *Jiwha* (tongue) and Twak (Skin), the hemoglobin needs to be much lesser than 8 gm/ dl, means most of the time in the subjects with chronic debilitating disease like renal, liver, malignancy or bleeding disorders.

Considering the reflection of *Rukshata* (dryness in 11 subjects), *Dourbalya* (weakness in 07 subjects), *Trishna* (excessive thirst in 02 subjects), *Sadana* (malaise in 03 individuals) and *Gourvata* (heaviness and lethargy in 05 subjects), it can be concluded

that the Panduroga in these individuals can be considered as in its Poorva Roopa (pre - clinical stage) resulting from the *Rasa Pradosha* due to several factors related to *Agnimandya* and dietary deficiency.

By going through the above table of results, it is obvious that all the classical signs of *Pandu Roga* can be observed one by one as per their severity and intensity that is from less severe and less intense to more severe and more intense as the Hemoglobin percentage goes on decreasing from its normal expected range to mild, moderate or severe decrease in its percentage.

CONCLUSION:

By this pilot observation study it can be concluded that

1. Anaemia that is defined as a Hemoglobin (Hb) concentration in the blood that is below the expected

value, when age, gender, pregnancy and certain environmental factors, such as altitude, are taken into account (WHO 2001), may vary from the *Samprapti of Pandu Roga.*

2. Stages of Pandu Roga can be formulated based on the range of the hemoglobin percentage as *Poorvarupa, Roopa and Bhedavasta.* Ranges of the hemoglobin from less than 12 gm/dl to 9 gm/dl (mild anaemia) can be considered as *Poorvarupa stage I*; less than 9gm/dl to 7 gm /dl (moderate anaemia) *as Poorvarupa stage II*; less than 7gm/dl to 5gm/dl (moderate anaemia stage II) can be considered as *Roopaavastha stage* and hemoglobin concentration less than 5 gm/dl (severe anaemia) as *bhedavastha.*

3. Full blown *Panduroga* may be evident only with severe anaemia, whereas mild to moderate anemia may not be reflecting exact *Panduroga Samprapti.*

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