

STUDIES ON MEDADUSTI IN PANDU W.S.R. TO ITS THERAPEUTIC MEASURES
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ABSTRACT

Introduction: Pandu is a disease mentioned in *Ayurveda* that can be correlated with anaemia. In *Pandu*, diminution of *Rakta Dhatu* (blood) & *Meda Dhatu* (fatty tissue and lipids) occurs. Due to intake of several causative factors, *Pitta Dosha* gets vitiated, due to which *Agni* (digestive fire) gets deranged, as a result of which *Ahara Paka* (the process of digestion of food) & *Dhatu Paka* (the process of metabolism) are also get altered which ultimately results in a diminution of *Rakta & Meda Dhatu*. *Meda Dhatu* comprises of two parts - *Sthayi Meda* (can be compared with adipose tissues) and *Drava Meda* (can be compared with circulatory lipids). In context with *Pandu* i.e., anaemia, the state of hypolipidemia should be evaluated and in context to *Meda Kshaya* in *Pandu* the decreased level of HDL should be the matter of concern and that hypothesis was verified through clinical study in the present study. **Aim & Objectives:** The present study was carried out to evaluate the role of *Meda Dhatu* in the pathogenesis of *Pandu* and to reveal the effectiveness of the stipulated drug i.e., *Sarapunkha* to combat *Pandu* as well as *Meda Dusti*. **Materials and Methods:** In selected 60 patients of *Pandu* having the *Medadusti Lakshan* based

on inclusion and exclusion criteria, the powder of the root of *Sarapunkha* (*Tephrosia purpurea* Linn) was administered in stipulated dose (6 grams in divided doses with plain warm water) for 90 consecutive days.

Observations & Results: The subjective parameters for *Meda Kshaya* are clinically present in a maximum number of *Pandu* patients. The result also reveals the significant efficacy of *Sarapunkha* on relevant subjective and objective parameters with a 'p-value <0.001 in the majority of subjective and objective parameters. **Conclusion:** In *Pandu*, the pathological phenomenon of occurrence of *Alpa Rakta* and *Alpa Meda* is present in the study sample which has been verified through subjective parameters & biochemically. The patients who are suffering from *Pandu* can be treated with the drug capable to correct *Meda Kshaya* like *Sarapunkha*.

Keywords: *Pandu*, *Medadusti*, *Meda Kshaya*, *Sarapunkha*

INTRODUCTION

Pandu is a disease that is clinically characterized by the generalized pallor of the skin & mucous membrane, produced as a resultant effect of *Dhatu Kshaya* (depletion of body tissues) specially *Rakta Kshaya* (depletion of blood) and *Meda Kshaya* (depletion of fatty tissue).⁽¹⁾ *Pandu* can be clinically co-related with anaemia. Globally, anaemia affects 1.62 billion people which corresponds to 24.8 % of the population. The highest prevalence is in preschool-age children (47.4%) and the lowest prevalence is in men (12.7%). The population group with the greatest number of individuals affected is non-pregnant women that is 468.4 million. In India anaemia affects 10 billion cases/year.⁽²⁾

In *Charaka Samhita*, very categorically it had shown that *Meda Dusti* (affliction of *Meda Dhatu* by vitiated *Doshas*) is an essential factor to cause *Pandu*. *Pandu* and *Meda Dusti* are interrelated as it is mentioned in *Charaka Samhita* that there are *Kshaya* of *Rakta* and *Meda Dhatu* takes place in the disease of *Pandu*. *Grahani Dosa* i.e., mal absorption is the main causative factor of *Pandu*.⁽³⁾ It is the root cause of malnutrition in *Pandu*. In *Charaka Samhita*, the chapter of disease *Pandu* is described after the chapter of *Grahani*. There is a sequence of the pathogenesis of *Pandu* from *Grahani Roga*. According to scholar *Chakrapani Dutta*, the aggravation of *Pitta* in *Grahani Roga* constitutes a predominant factor in the causation of *Pandu*, therefore the description of the treatment of *Pandu* follows the treatment of *Grahani Dosa*.⁽⁴⁾ Mainly *Tikshnagni* is responsible for the aggravation of *Pitta*. Though *Pitta* is *Ushna* (hot) in

character, by the virtue of *Drava Guna*, it deactivates the function of *Agni*.⁽⁵⁾ In *Charaka Samhita* it has been emphasized that, in the disease *Pandu* along with a diminution of *Rakta Dhatu*, *Meda Dhatu* is also diminished.⁽⁶⁾ Hence, the patient becomes emaciated. *Meda Dhatu* is attributed in two forms, one is "*Sthula Meda*" i.e., "*Sthayi Meda*" or adipose tissue and the "*Drava Meda*" i.e., Circulating lipids. Hence, there is a chance of presenting Hypolipidemia in the patient of *Pandu*. This dictum Acharya *Charaka* has been taken as a hypothesis in the present study.⁽⁷⁾ *Pandu* has been described as *Rasa Pradoshaja Vikara*; hence *Rasa Dhatu* gets involved in the initial stage of the disease. As *Hridaya* (heart) is the root of *Rasavaha Srota*, hence heart gets afflicted in *Pandu Roga*.⁽⁸⁾

In *Sushrut Samhita*, *Pandu Roga* is described as a sequence of *Hrid Roga*. In the treatise of *Astanga Hridaya*, the *Pandu Roga Nidan* is described after *Udar Nidan*. Scholar *Arun Dutta* has clarified the sequences of *Dosha Sanghata* in *Udar Roga* is the root cause of *Pandu*.⁽⁹⁾ Also, some authors have mentioned *Pandu* as *Upadrava* of *Udar Roga*. In *Madhava Nidan*, the chapter of *Pandu Roga* is described after the *Krimi Roga*. *Purishaja Krimi* produces *Pandu*, hence *Pandu Roga* is described after *Krimi Roga*.⁽¹⁰⁾

The hypothesis of the study is based on the concept of "*Alpa Meda*" in *Pandu*. The study is based on the hypothesis, of whether the status of the circulatory lipids is reduced or not. In *Charaka Samhita*, it has been denoted that patient of *Pandu* suffer in diminu-

tion of *Rakta Dhatu* and *Meda Dhatu*. In *Sushruta Samhita* facts of diminution of *Rakta Dhatu* is described but status of *Meda Dhatu* is not mentioned. In *Astanga Hridaya*, *Acharya Vagbhata* had followed the same conceptual principles of *Acharya Charaka*.

Meda definitely is the outcome of *Dhatu Paka*. *Dhatu Paka* takes place after effective *Avastha Paka*. If the *Agni* is altered and hypo functioning, then the process of *Avastha Paka* and *Dhatu Paka* is disturbed and as a result, the harmful effect of *Nidan Sevana* cannot be counteracted by the *Agni* and according to the type of *Nidana Sevana* the particular *Doshas* and *Dhatu*s get affected. The *Meda* in *Dhatu Paka* stage is yielded from *Meda Poshak* fraction of *Mamsa Dhatu* under the governance of *Mamsagni*.⁽¹¹⁾ In *Agnimandya* state, for the malfunctioning of both *Jatharagni* and *Mamsagni* formation of *Meda* also appears defective. In *Pandu*, it appears as *Meda Kshaya*. *Tvak*(skin) gets afflicted in *Pandu* and as *Tvak* is the root of *Mamsavaha Srota*,⁽¹²⁾ hence *Mamsa* is also afflicted. Aggravated *Vata*, *Pitta* and *Kapha* causes various ailments being residing in *Mamsa* i.e., *Mamsavaha Srota*. Following the hypothesis of transmission of *Dhatu Paka* (*Kedarikulya Nyay*) as expounded by scholar *Chakrapani Dutta*, certainly, the *Mamsagni* gets vitiated and *Meda Poshak* part inhibits *media* formation,⁽¹³⁾ that's why the person becomes '*Alpa Rakta Alpa Medoska*'.

The *Meda Dhatu* comprises two parts, one is the *Sthula Sthayi Dhatu* which remains in the pocket of fat in *Vapabaha* i.e abdominal fat.⁽¹⁴⁾ The other part of *Meda* is *Drava Meda* which circulates through the body and different *Srotas* to provide nutrition to all the *Dhatu*s.⁽¹⁵⁾ The crude *Meda* may be correlated with adipose tissue and the *Drava Meda* may be compared with circulatory lipids. So, the term *Poshan Krama* or nutrition to the *Dhatu*s by *Drava-Meda* is likely to the function of circulatory lipids as lipids are present in every cell of the human body to construct the cell structure, storing energy, transporting hormones, digestion, insulation and protection. Adipose tissue is the body fat comprised of adipocytes, which is the loose tissue contains the stromal-

vascular fraction (SVF) of cells including pre adipocytes, fibroblast, vascular endothelial cells are a variety of immune cells such as adipose tissue macrophages. This information regards the connection of *Meda* with *Rasa*, *Rakta* and *Mamsa* and also support the concept of formation of *Oja* as adipose tissue produces cytokines.

The main function of adipose tissue is energy storage and regulation of body heat. Free fatty acids (FFAs) are liberated from lipoproteins by lipoprotein lipase (LPL) and enter the adipocyte, where they are reassembled into triglycerides by esterifying them into triglyceride by esterifying them onto glycerol. Human fat tissue contains about 87% lipids. In *Pandu*, the major pathological criteria that take place, are *Rakta Kshaya* and *Meda Kshaya*. The point of our discussion in this present study is *Meda Kshaya* i.e., likely to be correlated with hypolipidemia. Hypolipidemia is a state in which there is a decrease in plasma lipoprotein caused by primary and secondary-factors refers to genetic and acquired hypolipidemia respectively. It is usually asymptomatic and diagnosed incidentally on routine lipid screening. The terms hypolipidemia and hypocholesterolemia and hypo beta lipo proteinemia (HBL) are used interchangeably in the literature and refer to reducing plasma cholesterol. Most authors use total serum cholesterol (TC). Total cholesterol is the total amount of cholesterol in the blood. Total cholesterol includes low-density lipoprotein (LDL) and high-density lipoprotein (HDL). The LDL and HDL are known as bad cholesterol and good cholesterol respectively.

In context to *Meda Kshaya* in *Pandu* the decreased level of HDL should be the matter of concern and that hypothesis was verified through a clinical study. Hypolipidemia has been described in various types of chronic anaemia.⁽¹⁶⁾ The exact cause of Hypolipidemia in an anaemic patient is not known. Some authors have been suggested that cholesterol deficiency leads to rigidity of erythrocytosis making them more prone for destruction.⁽¹⁷⁾ *Rakta* provides nutrition to both the *Drava Meda* and *Sthula Meda*, render supported by the information of the physiology of blood where it is mentioned that blood boost up

the adipocytes and transport lipoprotein. Hence Rakta Kshaya is the root cause of Meda Kshaya.

In the above context, the present study was carried out with the following aims and objectives:

1. To study the diagnostic approach of *Pandu*.
2. To evaluate the role of *Meda* in pathogenesis of *Pandu*.
3. To reveal the effectiveness of the stipulated drug i.e., *Sarapunkha* to combat *Pandu* as well as *Meda Dusti*.

MATERIALS AND METHODS:

Study Settings:

The present study is an interventional, prospective, randomized clinical study with single group which has been treated with root powder of the plant *Sarapunkha* (*Tephrosia purpurea* Linn.)⁽¹⁸⁾, 6 g / day in divided doses for ninety consecutive days.

Selection of Drug:

The powder of the root of *Sarapunkha* (*Tephrosia purpurea* Linn.) which was administered in patients, belongs to the family *Fabaceae*. It has *Tikta*, *Kasaya Rasa*, *Laghu*, *Ruksa*, *Tiksna Guna*, *Usna Virya*, *Katu Vipaka* and having *Karma* like *Kapha vata hara*, *Visaghna*, *Vranahara*, *Jvarahara*, *Krimighna* and *Rasayana*.⁽¹⁹⁾

Duration of Study:

The entire study was completed in two years.

Definition of Populations:

A small sample had been taken from the population of those who were suffering from *Pandu*, visiting the OPD & IPD of the Institute of Post Graduate Ayurvedic Education and Research at Shyamadas Vaidya Shastra Pith Hospital, Kolkata irrespective of their sex, occupation & religion. At first, the patients were selected based on subjective and objective criteria of *Pandu*, thereafter, signs and symptoms of *Meda Dusti* have been explored within them.

Inclusion Criteria:

1. Adult subjects of either sex between 16-70 yrs. of age.
2. Presence of cardinal sign & symptoms of *Pandu*.
3. Patients below haemoglobin level, in case of male 13.8g/dl & in case of female 12.1g/dl.
4. Morphological characteristics of RBC sup-

porting nutritional anaemia including iron deficiency anaemia.

5. Patients below normal level of serum ferritin
6. Willingness to give written consent to participate in the study.
7. Patients those who are not receiving any other therapies except for research medicine.

Exclusion Criteria:

1. Severe anaemia where Hb% count is below 5mg/dl.
2. Anaemia introducing thalassemia, leukaemia, sickle cell anemia, aplastic anaemia, hereditary spherocytosis etc.
3. Any malignant condition, bone marrow disease presenting anemia.
4. Co-existing chronic diseases.
5. Patient receiving any other treatment for the same disease or any other systemic disease.
6. Anaemia due to Helminthiasis.

Sample Size:

A total of 70 patients were selected for the study of which about 10 patients were dropped out during the study. So, the complete study was carried out on 60 patients.

Methods of Data Collection:

The drug had been administered for 90 consecutive days for each patient and assessed after 90 days following the date of registration.

Schedule of Data Collection:

In each group, the subject will be required at least 4 visits during studies:

1. Visit 1 – Screening & enrolment (baseline)
2. Visit 2 – First follow-up (Day 30)
3. Visit 3 – Second follow-up (Day 60)
4. Visit 4 – Final follow-up (Day 90)

Subjective Parameters:

A. Subjective Parameters for *Pandu*:⁽²⁰⁾

1. *Hatanala*. (Suppression of the power of digestion)
2. *Durvala*. (Weakness)
3. *Annadvit*. (Repugnance against food)
4. *Bhrama* (Feeling of Giddiness)
5. *Shrama*. (Fatigue)
6. *Gatra Shula* (Pain in the body)

7. *Aruchi*. (Anorexia)
8. *Shunakshi Kota* (Swelling of the orbital region)
9. *Shirna Loma* (Falling out of the small hairs of the body)
10. *Hataprabha*. (Losing of bodily luster)
11. *Kopana*. (irritability)
12. *Nidralu*. (Feeling of sleepy always)

B. Subjective Parameters for Meda Kshaya: ⁽²¹⁾

1. *Pleehabhi Vriddhi* (Enlargement of spleen)
2. *Ruksha Twak* (Dryness of the skin)
3. *Medura Mamsa Prarthana*. (Craving for fatty meat)
4. *Karshya* (Emaciation)
5. *Sandhi Shunyata* (Feeling of emptiness of the joints/joint crepitus)

Objective Parameters:

1. Complete Blood Count (Hb%, TLC, DLC, ESR, MCV, MCH, MCHC, TIBC, Platelet)
2. Estimation of Serum Ferritin
3. Estimation of Serum Lipid Profile

statistical analysis:

The information gathered based on the observation made about various parameters was subjected to statistical analysis in terms of Mean, Standard Deviation (SD) and Standard Error (SE). Paired 't'-test was carried out at $P < 0.05$ and $P < 0.001$. The obtained results were interpreted as $-P < 0.05$ is significant & $P < 0.001$ is highly significant.

Preparation of Clinical report File (CRF):

Prior to the administration of the drug, Informed

Consent Form (ICMR guideline) was filled by the willing patients. Clinical Report File (CRF) was prepared in which all the clinical and therapeutic data of individual patients along with dropout cases has been recorded.

OBSERVATIONS AND RESULTS:

The distribution of subjective parameters for *Pandu* among the 60 patients shows that cent percent of patients were suffering from the feature of *Daurvalya* & *Hataprabha* both. The next higher group is 96.6% were suffering from *Hatanala* & *Annadvit* both. Other notable percentage are 93.3% & 91.6%, where patients were suffering from *Srama* & *Sisiradwesi* respectively (Table 1). Whereas the distribution of subjective parameters for *Meda Kshaya* among the patients of *Pandu* shows that 76.6%, 63.3%, 63.3% & 26.6% of patients are clinically assessed with the symptoms of *Ruksha Twak*, *Medura Mamsa Prarthana*, *Karshya* and *Sandhi Shunyata*, hence satisfying the criteria of *Meda Kshaya* (Table 2). Statistical analysis of subjective and objective parameters in patients of *Pandu* as well as in subjective and objective parameters of *Meda Kshaya* in the patients of *Pandu*, before and after treatment shows that 'p-value < 0.0001 in the majority of the parameters, which indicates that the stipulated drug *Sarapunkha* is highly efficacious in the management of *Pandu* and also in combating *Meda Kshaya* in *Pandu* by its *Tikta - Kasaya Rasa*, *Laghu - Ruksa - Tikсна Guna*, *Usna Virya* & *Katu Vipaka*.

Table 1: Distribution of subjective parameters of *Pandu* among the 60 patients:

Sl.No.	SubjectiveCriteria	Noofpatients	Percentage (%)
1	<i>Hatanala</i>	58	96.6
2	<i>Durvala</i>	60	100
3	<i>Annadvit</i>	58	96.6
4	<i>Shrama</i>	56	93.3
5	<i>Gatra Shula</i>	48	80
6	<i>Aruchi</i>	53	88.3
7	<i>SunakshiKota</i>	8	13.3
8	<i>Shirna Loma</i>	15	25
9	<i>Hataprabha</i>	60	100
10	<i>Kopana</i>	15	25
11	<i>Nidralu</i>	6	10
12	<i>Bhrama</i>	12	20

Table 2: Distribution of subjective parameters of *Meda Kshaya* in 60 patients of *Pandu*:

Sl.No.	Criteria of Meda Kshaya	No. of Patients	Percentage
1	<i>Pleehabhi Vriddhi</i>	Nil	0
2	<i>Ruksha Tvak</i>	46	76.6
3	<i>Medura Mamsa Prarthana</i>	38	63.3
4	<i>Karshya</i>	38	63.3
5	<i>Sandhi Shunyata</i>	16	26.6

Table 3: Follow-up assessment of Subjective & Objective Parameters of *Pandu* before and after treatment:

Parameters	Mean BT	Mean AT	SD +/-	SE +/-	't' Value	'p-Value
<i>Hatanala</i>	2.18	0.75	0.83	0.16	9.1	<0.001
<i>Durvala</i>	1.71	0.90	1.35	0.26	3.1	<0.05
<i>Annadvit</i>	2.04	0.63	0.56	0.107	13.08	<0.001
<i>Shrama</i>	1.35	0.75	1.12	0.21	2.78	<0.05
<i>Gatra Shula</i>	1.86	0.9	0.57	0.10	8.76	<0.001
<i>Aruchi</i>	1.34	0.37	0.55	0.105	9.21	<0.001
<i>Sunakshi Kota</i>	2.86	2.5	0.41	0.12	3.0	<0.05
<i>Shirna Loma</i>	1.57	0.93	0.68	0.19	6.38	<0.001
<i>Hataprabha</i>	2.09	0.72	0.54	0.104	11.66	<0.001
<i>Kopana</i>	2.86	2.5	0.47	0.12	3.0	<0.001
<i>Nidralu</i>	2.56	0.91	0.663	0.12	13.75	<0.001
<i>Bhrama</i>	1.31	0.36	0.58	0.113	8.4	<0.001
Hb%	8.37	11.34	0.86	0.15	19.3	<0.001

Table 4: Follow-up assessment of Subjective & Objective Parameters of *Meda Kshaya* inpatients of *Pandu* before and after treatment:

Parameters	Mean AT	Mean BT	SD +/-	SE +/-	't' Value	'p-Value
<i>Ruksha Tvak</i>	3.71	2.07	0.50	0.133	12.33	<0.001
<i>Medura Mamsa Prarthana</i>	3.438	3.142	0.462	0.124	2.3	<0.05
<i>Karshya</i>	2.14	0.74	0.51	0.10	14.57	<0.001
<i>Sandhi Shunyata</i>	3.438	3.142	0.462	0.124	2.3	<0.05
<i>Serum HDL Cholesterol</i>	13.3 (Mean)		1.79	0.34	39.11	<0.001

DISCUSSIONS

Table no.1 shows that the patients of the sample are satisfying the subjective criteria of *Pandu*. It reveals that the selected patients are suffering from *Pandu*. Cent percentage of the patients are satisfying the criteria of '*Hataprabha*' which implies the criteria of generalized pallori. the pale complexion of the skin. *Daurvalya* in cent percentage of people supports the evidence of *Oja Kshaya* and *Rakta Kshaya*. Feature of *Hatanala* in 96.6% represent *Agnimandya*. Other notable percentages are the identical feature of *Pandu* present in the sample together represents the evidence

of *Rasa*, *Rakta* and *Oja Kshaya*. Analysis of percentile data determines that all the patient included in the study are suffering from *Pandu*. Table no. 2 shows that the clinical criteria of *Meda Kshaya*, is present in the sample in the major patient, according to the percentile values. The literary information of *Meda Kshaya* in *Pandu* is verified by these data, and it reveals that sequences of *Meda Kshaya* take place in the disease process of *Pandu*. Regarding the point *Karshya*, it is to be said that no instrumental measurement has been taken, evaluation is done on the basis of macroscopic view of one observe only. The feature of *Pleehavi Vriddhi* i. e splenomegaly is ab-

sent in the sample, it may be due to exclusion of hepato-splenomegaly in this present study. Table no 3 and table no 4 shows the improvement of subjective & objective criteria which denotes that *Sarapunkha* along with correcting the reduced level of Haemoglobin count combats *Meda Kshaya* internally which reduces the external manifestation of subjective criteria at a sustainable rate. In *Ayurveda* pharmacodynamics, *Sarapunkha* (*Tephrosia purpurea* Linn.) is found to be *Kapha-Vata Hara* (pacifies Kapha & Vata Dosh), *Vrana Hara* (heals ulcers), *Jwara Hara* (pacifies fever), *Visaghna* (anti-toxic), *Krimighna* (antihelminthic) and *Rasayana* (rejuvenating). *Sarapunkha* contains *Tikta-Kasaya Rasa*, *Laghu-Ruksha-Tikshna Guna*, *Usna Virya*, *Katu Vipak*, so it is advised as the good medicine in *Pandu* as well as in *Meda Dusti*, a hypothetical feature in the pathogenesis of *Pandu*. Hence the effectiveness of *Sarapunkha* is established in management of *Pandu*.

CONCLUSION

The study of the pathogenesis of *Pandu* reveals that the *Pitta* located in the heart is involved in course of the disease which vitiates the other fractions of *Pitta* through *Dasavidha Dhamani*, especially the *pitta* located in the skin. *Agnimandya* in *Pandu* causes altered *Dhatupaka*, which results in insufficient production of *Oja*, for this reason, the symptomatology of *Indriya Shaithilya*, *Dourvalya*, *Sara Heenata* etc. develop. All the patients in this study sample had satisfied the subjective criteria of *Pandu*, which denotes that every individual of the sample is suffering from *Pandu* irrespective of all *doshas*. Decreased Cholesterol level as a whole along with the mild low level of HDL Cholesterol in the sample shows that along with the decreased blood components the patients are also showing the evidence of low Lipid Components, may be due to nutritional origin, induced by the *Aharaja Nidan*. Declined level of HDL Cholesterol which may be interpreted as *Prakrita Meda*, rendering support to the dictum of '*Alpa Rakta Alpa Medaska*.' Again, improvement of good Cholesterol levels implies that *Sarapunkha* (*Tephrosia purpurea*) can increase the *Meda*. As there is no literary reference of

Sarapunkha to correct altered *Meda*, so it is to be interpreted that quantitative and qualitative improvement of *Rakta* i.e., blood and blood components are the indirect cause to improve *Prakrita Meda*. Therefore, at the end of the study it is to be concluded that in *Pandu* the pathological phenomenon of occurrence of *Alpa Rakta* and *Alpa Meda* is present in the study sample which had been verified biochemically and also *Sarapunkha* is an excellent remedy to treat *Pandu* and *Meda Kshaya*.

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