



STUDIES ON THE CONCEPT OF OJA AND ITS EVALUATION IN RASAVAHA SHROTODUSHTI: A PROSPECTIVE RANDOMIZED COHORT STUDY

Afroja Yeasmin Akhtar Roji ^{1*}, Abichal Chattopadhyay ², Apala Sengupta ³, Gopeswara Mukherjee ⁴

¹ Ph.D. Scholar, Department of Samhita and Sanskrit, F/O-Ayurveda, IMS, BHU, Varanasi, India

² Professor and HOD, Department of Ayurveda Samhita and Siddhanta, Institute Post Graduate Ayurvedic Education and Research at Shyamadas Vaidya Shastra Peeth Hospital, Kolkata, West Bengal, India

³ Professor and HOD, Department of Roga Nidana and Vikriti Vigyana, Institute Post Graduate Ayurvedic Education and Research at Shyamadas Vaidya Shastra Peeth Hospital, Kolkata, West Bengal, India

⁴ Ex-Guest Lecturer, Department of Roga Nidana and Vikriti Vigyana, Institute Post Graduate Ayurvedic Education and Research at Shyamadas Vaidya Shastra Peeth Hospital, Kolkata, West Bengal, India

*Corresponding Author Email: rosyafroz89@gmail.com

DOI: 10.7897/2277-4572.095180

Received on: 16/07/20 Revised on: 04/08/20 Accepted on: 11/08/20

ABSTRACT

In all the diseases oja (effective component of all the dhatus) gets affected for the production of the disease of the respective system resulting with Shrotodushti. The clinical observation reveals that pandu is the disease of the Rasavahashrota where rasauja in terms of T-lymphocytes subsets get affected. This study was prospective randomized cohort study carried out by arranging 40 individuals in two groups, out of which 30 individuals are in one group (group-A), treated with Shatavari mula Swarasa (orally, 12 ml/day in divided doses in the early morning and evening before food) and another group-B contained 10 healthy volunteers (as control group). Patients were selected from OPD and IPD of the institute- Institute of Post Graduate Ayurvedic Education and Research at Shyamadas Vaidya Shastra Pith. Selection was done as per subjective criteria of Panduroga (sign and symptoms) along with sign and symptoms of oja visramsa and objective criteria- viz-hematological (ferritin) and immunological parameters (CD3, CD4, CD8 and CD4:CD8). Exclusion and inclusion criteria were also followed. Before and after treatment effects had been assessed statistically and it was revealed that shatavari is effective in pandu by correcting the alteration of rasauja in respect to CD3, CD4 and CD8 cells suggesting the effects on T-cell activation with p value < 0.001. Due to pharmacological properties it acts in pandu and enhance the level of hemoglobin. Virtually having guru and Snigdha guna it acts against the vitiation of rasauja to prevent dushti of Rasavahashrota which are the main site for Panduroga samprapti.

Keywords: Oja, ojavisramsha, vyadhikshamatva, cell-mediated immunity, t-lymphocytes-iron deficiency, Panduroga.

INTRODUCTION

Oja is the supreme Pranayatana out of ten pranayatana¹. Here Prana signifies the sense of vital parts of the body². It's the supreme essence of all the dhatus and responsible to increase the protective force of the body. Oja is of two types – Para and aparaoja³. The respective dhatujaoja is accounted under aparaoja. Sustaining the normal state of oja, the individual can lead a healthy life. Ojakshaya leads to various diseases and decay of the body⁴. All the dhatu possess their respective oja. Therefore, the assessment of oja is essential but prior to that the concept of oja is required to be explored in the modern purview.

In the pathology of every disease it reflects that, the responsible Shrota gets affected due to alteration of its oja. So, the categorical evaluations of these Ojas are still relevant in the consequent pathogenesis of different diseases. The clinical observation reveals that pandu is the disease of rasavahashrota⁵ where rasauja in terms of T-lymphocyte subsets get affected. Affected rasauja may result different types of disorders of different Shrotodushti, in the sequence of anulomakshaya. Levels of cytokines such as IL-2, IL-6 have also been found to be significantly lower in iron deficiency⁶. Pandu is a disease caused by due to dhatukshaya, grahani dosha and krimiroga and where multiple dhatus are affected by vitiated doshas. Along with these dhatus, another vital element of body is also got affected i.e. Ojas. With the progression of the disease, there is much and much loss of Ojas⁷ that ultimately results into breakage of the defense system of body

i.e. immunity. Some other parameters of immune system like delayed type of hypersensitivity responses and proliferative responses of lymphocytes have been conclusively shown to be impaired for iron deficiency⁸. 22 known essential amino acids and nonessential amino acids affect a broad range that amino acids play an important role in the field of physical and mental processes. Recent studies have witnessed the discovery that amino acids are cell signaling molecules as well as being regulators of gene expression and the protein phosphorylation cascade. Majority of neurotransmitters can influence mind-body interactions and are composed of amino acids⁹.

Shatavari is a conventional drug, which is very much effective in pandu due to its Ojavardhaka and rasayana activity¹⁰. To further substantiate and elucidate the Pandu hara activity of this drug incorporating the concept of oja and rasauja in specific in respect to T-lymphocyte subsets, clinical evidence is needed which at present are lacking. Therefore, the function of oja is identically implied to the function of essential and non-essential amino acids and subsequently assay of CD3+, CD4+, CD8+ and CD4:CD8 cells reflects the functional state of amino acids as well as rasauja in specific. So, the aim is to evaluate the concept of oja and specifically the altered status of rasauja in dhatukshaya pandu in concordance to t-lymphocyte subsets and subsequently the effectiveness of shatavari as therapeutics in this condition was evaluated through cohort study.

MATERIAL AND METHODS

Drug

Shatavari – *Asparagus racemosus*, family- Liliaceae, rasa- Madhura, Tikta; **guna** - Snigdha, Laghu; **Vipaka**- Madhura, **Dosha karma**- Vatapitta hara, pittajitkaphavat hara. **Prabhava**- rasayana, Ojavaradhaka; **Preparation of Swarasa**- fresh green wet herbs i.e. Shatavari mula were collected from the apothecary of institution and make them into paste form after cleaned with fresh water by pounding. Then the juice was extracted by squeezing and filtering through a clean cloth or yantra. **Dose** - 12 ml, **time of administration**: in empty stomach at morning and evening time before food, **Anupana**: water; **Duration**: 90 days. **Chemical composition**¹²- Roots of Shatavari contains sarapogenine, shatavarin-IV, shatavoroside- A and B, vitamin-A, B2 and E and iron. It also has the immunomodulatory, immunostimulant and immunoadjuvant-potential and antioxidant activity^{13,11}

Selection of subjects

A total of 60 subjects irrespective of gender, caste, religion and socioeconomic status were selected from the outpatient department of basic principal and indoor patients department of the institute of post graduate Ayurvedic education and research at S.V.S.P. Hospital, Kolkata, West Bengal, India. The study was approved by the institutional ethics committee (memo no. SVP/559/2017 dated 29.05.2017). Written informed consent from each patient was obtained before starting the course of the treatment. The study was prospective randomized cohort study. Sampling technique was simple random sampling by computer generated method.

Sample Size and Sample Design

The study was prospective, randomized, cohort study. A total 60 individuals were included for the study, out of them 20 was dropped out to achieve a sample size of 40 subjects which was divided in to two Group- A (contained 30 patients of pandu) and Group- B (contained 10 healthy individuals) respectively.

Duration and Design of the Study

This study was completed within two years of commencement.

Diagnostic Criteria

Subjects were diagnosed and assessed thoroughly on the basis of ayurvedic classical signs and symptoms of pandu¹⁴ (the diseases which occurred due to any alteration of blood) along with sign and symptoms of ojavisrams¹⁵ and were examined on the basis of specially prepared proforma along with a detailed history. All the patients were subjected to routine hematological examination (HB, RBC, PCV, MCV, MCH, MCHC, RDW, TLC, lymphocytes, platelet, reticulocyte count) and biochemistry investigations (FBS, PPBS, serum bilirubin, blood urea, creatinine, CD3+, CD4+ CD8+, serum ferritin, SGOT, SGPT and urine (urea and creatinine) to rule out any other pathology before treatment.

Inclusion Criteria

Group-A were adult subjects of either sex between (10-40) years, presence of cardinal sign and symptoms of pandu along with ojavisrams, hemoglobin level < 11 gm/ dl, no intake of haematinics in preceding one month, willingness of giving

written consents and **Group-B** contains adult subjects of either sex between (10-40) years, having the dhatusamyalakshan¹⁶, without having any minor and major pathological condition, absence of anemia and iron deficiency with haemoglobin > 11 gm/dl, no intake of haematinics in last 1 month.

Exclusion Criteria

Group-A were subjects having age less than 10 years and more than 40 years, not having cardinal sign and symptoms of pandu along with ojavisrams, hemoglobin level > 11 gm/dl, intake of haematinics in preceding one month, history of chronic disease, under medication for any pathological condition, not willing to give written consent and **Group-B** were volunteers below 10 years and above 40 years of age.

Method and Schedule of Data Collection

The drug was administered for 90 consecutive days for each patient of Group-A and objective parameters were assessed after 90 days from the day of registration. Compliance were also been assessed in every 30 days interview. During this period, clinical parameters were assessed in every interval of 30, 60 and 90 days. Subjective parameters were statistically analyzed by help of scoring of subjective parameters. Objective parameters were also recorded at the beginning of treatment and after 3 months of drug administration.

Study Variables

Respective relevant objectives parameters like- HB, RBC, PCV, MCV, MCH, MCHC, RDW, TLC, lymphocytes, platelet, reticulocyte count, cell count of CD3+, CD4+ and CD8+, CD4:CD8 ratio, HB% and serum ferritin are variables which were analyzed statistically.

Subjective Parameters

Subjective parameters of group A were follows (with scoring)-

1. Hridspandanam (palpitation)

Features score

- no feeling of palpitation during any movement-0
- feeling of palpitation occasionally during working-1
- feeling of palpitation during walking-2
- feeling of frequent palpitation without any movement-3

2. Raukshata (unctuousness)

Features score

- normal skin lustre-0
- roughness due to atmosphere-1
- roughness during touch-2
- visualized persisting roughness-3

3. Swedabhava (absence of sweating)

Features score

- occurrence of normal sweating-0
- absence of sweating on specific part on mild exertion-1
- mild sweating after doing heavy exertion-2
- absence of sweating during work-3

4. Shrama (fatigue)

Features score

- a) fatigue relieved by rest-0
- b) fatigue not relieved by rest, limiting instrumental (e.g. - preparing meal, shopping and managing the money)-1
- c) fatigue not relieved by rest, limiting selfcare-2
- d) feeling of tiredness that has gradual onset it can be alleviated by period of rest-3

5. Jwara (rise of temperature/produce pain)

Features score

- a) body temperature is in normal state-0
- b) rise of body temperature occasionally in 24 hours-1
- c) rise of body temperature in particular time in 24 hour-2
- d) rise of the body temperature continuously in 24 hours-3

6. Shwasa (difficulty in respiration)

Features score

- a) no breathing difficulty occurs during movement-0
- b) breathing difficulty occurs occasionally in 24 hours during movement-1
- c) breathing difficulty occurs in particular time in 24 hours in working time-2
- d) breathing difficulty occurs continuously in 24 hours during working time-3

7. Aruchi (unwillingness for food)

Features score

- a) willingness towards the all foods-0
- b) unwillingness of food occurs occasionally-1
- c) unwillingness for food but could take the meal-2
- d) totally unwillingness for food-3

8. Pindikoudvestanam (cramping pain calf region)

Features score

- a) no cramping pain in calf muscle in 24 hours-0
- b) cramping pain presents in calf muscle occasionally in 24 hours-1
- c) cramping pain presents in calf muscle in particular time in 24 hours-2
- d) cramping pain presents in calf muscle continuously in 24 hours-3

9. Trishna (feeling of thirst)

Features score

- a) normal feeling of thirst-0
- b) feeling of thirst, but quench with sufficient water-1
- c) frequent feeling of thirst, quench with sufficient water-2
- d) frequent feeling of thirst, but quench with increased amount of water-3

10. Karshyam (through BMI)

Features score

- a) Ideal weight BMI = 20-22-0
- b) under-weight endurance athlete BMI = 20-18.5 -1
- c) moderate thinness BMI = 16-16.99 -2
- d) severe thinness = BMI < 16-3

11. Sandhi vislesana (looseness of the joints)

Features score

- a) normal intact joint-0
- b) sprained but not intact joint-1
- c) partials torn of ligaments and mild distortion-2
- d) vertical instability and complete distortion of joints-3

12. Gatranam-sadanam (prostration/ fatigue and weakness)

Features score

- a) fatigue relieved by rest with sleep-0
- b) fatigue not relieved by rest, limiting instrumental (e.g. Preparing meal, shopping and managing the money, using the telephone) with mild sleep-1
- c) fatigue not relieved by rest, limiting self-care, (e.g.-bathing, dressing/ undressing, feeding, self-using the toilet) with moderate sleep-2
- d) feelings of tiredness that has gradual onset, it can be alleviated by period of rest with excessive sleep-3

13. Doshachyavanam (displacement of doshas -vata, pitta and kapha from their normal seats)

a) Displacement of vatadosha

Features score

- a) movement of things in wrong direction inside the alimentary tract which is relieved by vomiting-0
- b) mild gurgling sound in abdomen occasionally-1
- c) Moderately gurgling sound in abdomen-2
- d) More gurgling sound in abdomen-3

b) Displacement of pitta dosha

Features score

- a) no feeling of burning sensation-0
- b) feeling burning sensation locally-1
- c) burning sensation all over the body-2
- d) feelings of hot fumes coming out from the stomach-3

C) Displacement of kapha-dosha

Features score

- a) normal appetite-0
- b) loss of appetite with indigestion-1
- c) indigestion along with debility of the body-2
- d) debility of the body with vomiting-3

14. Kriya-sannirodhacha (Hindrance to all physical vocal-mental action or movements)

Mana-sannirodhah (depression)

Features score

- a) no feelings of depression-0
- b) feelings of depression in favorable and unfavorable condition-1
- c) intermittent depression-2
- d) continuous depression-3

Statistical Analysis

The control and the iron deficient group were compared for hematological and immunological parameter using the unpaired t-test. At the end of the Shatavari (*Asparagus racemosus*) tuber juice administration, hematological and immunological status of the 30 number of pandu (iron deficient adult) who were followed up were compared using the pair t-test. Data was also analyzed using SPSS V.11 statistical analysis. The values were considered significant at the levels of $p < 0.005$, $p < 0.001$ and $p < 0.001$.

RESULT

Follow up assessment shows highly significant clinical improvement in these patients. But statistically it is established Group-A had showed highly significant result ($P < 0.001$) in all

the objectives parameters (Table 2) when compared with control group.

Biochemical and haematogenic parameters measured (before and after treatment) in our study population are reported in Table 3. There was a statistically significant difference between all haematogenic parameters in two groups (study and control), ($p < 0.001$).

Table 3 shows Hemoglobin, packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and MCHC and serum ferritin increased significantly ($P < 0.001$) after completion of drug administration. All cases recorded a mean change in Hb, which ranged before and after treatment 10.79 and 9.50. Twenty nine of the 30 patients recorded a rise in hemoglobin, which was more than 7 gm/dl; 23 of the 30 patients became non anemic at the end of the study, i.e. with hemoglobin > 11 gm/dl. The mean value of serum ferritin increased. The change was statistically significant ($< p < 0.001$) after administration of drug which was before treatment -23.89 and after treatment -33.65.

Biochemical and haematogenic parameters measured (after treatment) in our study population are reported in Table 4, which was a comparable to the mean value in the control group. The mean CD3, CD4 and CD8 count rose significantly ($P < 0.001$) after drug administration and was comparable to the mean value in the control group (Table 4).

Clinical Analysis

Table 1: The distribution of subjective criteria of thirty patient's pandu

S. No.	Subjective Criteria	N = 30	Percentage (%)
1	Hridspandanam (palpitation)	30	100
2	Rukshata (unctuousness)	22	73.33
3	Sweda abhava (absence of sweating)	12	40
4	Shrama (fatigue)	30	100
5	Jwara (rise of temperature/produce pain)	19	63.33
6	Shwasa (difficulty in respiration)	23	76.67
7	Aruchi (unwillingness for food)	30	100
8	Pindikoudvestanam (cramping pain calf region)	28	93.33
9	Trishna (feeling thirst)	25	83.33
10	Sadana (prostration/ fatigue and weakness)	29	96.66
11	Sandhivishlesh (looseness of the joints)	13	43.33
12	Kriya-Sannirodha (hindrane to all physical vocal-mental action or movements)	8	26.67
13	Dosha Chavanam (displacement of doshas -vata, pitta and kapha from their normal seats)	30	100
14	Karshyam (through BMI)	11	20
Total		30	100

Table 2: Follows up assessment of subjective parameters of pandu (Group-A) after treatment

Subjective Parameters	Mean BT	Mean AT	SD ±	SE ±	't' Value	'p' value	
Hridspandanam	2.47	1.20	0.74	0.14	9.38	< 0.001	
Rukshata	2.33	1.00	0.84	0.15	8.65	< 0.001	
Sweda abhava	2.03	1.26	0.84	0.16	3.45	< 0.01	
Shrama	2.33	1.16	1.08	0.19	5.88	< 0.001	
Jwara	2.07	1.07	0.74	0.14	7.37	< 0.001	
Shwasa	2.06	0.97	1.02	0.18	5.85	< 0.001	
Aruchi	2.03	1.07	0.56	0.10	9.52	< 0.001	
Pindikoudvestanam	2.27	1.13	0.97	0.18	6.38	< 0.001	
Trishna	2.23	0.90	0.92	0.17	7.92	< 0.001	
Gatra-Sadana	2.43	1.30	0.94	0.17	6.62	< 0.001	
Dosha-Chavanam	Vata	2.03	1.07	0.81	0.15	6.55	< 0.001
	Pitta	2.04	0.93	0.84	0.15	7.13	< 0.001
	Kapha	1.83	0.93	0.76	0.14	6.50	< 0.001
Kriya-Sannirodha	2.00	1.00	0.79	0.14	6.95	< 0.001	
Karshyam (BMI)	22.11	23.19	0.86	0.15	6.87	< 0.001	

Analysis of Objective Parameters

Table 3: BT and AT result (paired t test) of objective parameters of pandu (Group-A)

Objective Parameters	Mean BT	Mean AT	SD ±	SE ±	't' Value	'p' Value	C.S.
CD3	1013.46	1139.46	100.54	18.33	6.84	< 0.001	H.S.
CD4	645.43	730.66	111.55	20.36	4.18	< 0.001	H.S.
CD8	399.20	455.60	71.37	13.03	4.32	< 0.001	H.S.
CD4 : CD8	3.8	1.91	3.76	0.68	2.78	< 0.02	H.S.
Ferritin	23.89	33.65	10.68	5.76	5.00	< 0.001	H.S.
Hb%	9.50	10.79	0.69	0.12	10.09	< 0.001	H.S.
RBC	3.80	4.46	0.48	0.08	7.71	< 0.001	H.S.
MCV	63.03	72.38	6.28	1.14	8.14	< 0.001	H.S.
PCV	32.40	36.55	2.85	0.52	7.94	< 0.001	H.S.
MCH	22.29	29.01	3.76	0.68	9.78	< 0.001	H.S.
MCHC	30.75	37.22	4.14	0.75	8.01	< 0.001	H.S.
TLC	7.23	8.32	0.88	0.16	6.81	< 0.001	H.S.
RDW%	15.35	12.90	2.18	0.39	6.12	< 0.001	H.S.
Platelets	191.70	206.0	38.75	7.07	2.05	< 0.05	S
Lymphocyte	1.22	1.66	0.31	0.05	7.77	< 0.001	H.S.
Reticulocyte	0.79	1.22	0.52	0.09	4.49	< 0.001	H.S.

*** H.S. = highly significance ***S = significant

CD-cluster of differentiation MCH-mean corpuscular hemoglobin; MCHC-mean corpuscular hemoglobin concentration, Hb-hemoglobin, MCV-mean corpuscular volume, PCV-pact cell volume, RDW-red blood cell distribution width, TLC-total leucocyte count.

Table 4: Descriptive statistics for Pandu group (Group-A) and Healthy control group (Group-B)

Parameters	(Group-A) (after treatment)			Healthy Control group (Group-B)		
	No	Mean	SD	No	Mean	SD
CD3	30	1139.46	100.54	10	1543.72	326.13
CD4	30	730.66	111.55	10	442.70	51.98
CD8	30	455.60	71.37	10	175.30	67.95
CD4:CD8	30	1.91	3.76	10	2.74	0.74
Ferritin	30	33.65	10.68	10	46.28	16.61
Hb%	30	10.79	0.69	10	12.32	0.43
RBC	30	4.46	0.48	10	4.03	0.21
MCV	30	72.38	6.28	10	82.94	6.42
PCV	30	36.55	2.85	10	28.94	1.37
MCH	30	29.01	3.761	10	30.69	1.40
MCHC	30	37.22	4.146	10	39.10	3.95
TLC	30	8.32	0.88	10	8.93	0.90
RDW%	30	12.90	2.188	10	12.26	0.68
Platelets	30	206.0	38.750	10	148.50	23.35
Lymphocyte	30	1.66	0.313	10	1.22	0.28
Reticulocyte	30	1.22	0.523	10	1.94	1.34

Table 5: The statistical analysis (Unpaired "t" test) for the Pandu group (Group-A) and healthy control group (Group-B)

Objective Parameters	Pandu Group (Group-A)			Healthy Control Group (Group-B)			Comparison of both groups (unpaired 't'- test)		
	No.	Mean	SD±	No	Mean	SD±	"t" value	"p" Value	Remarks
CD3+	30	125.66	100.54	10	1543.72	326.13	2.712	< 0.02	S**
CD4+	30	85.23	111.55	10	442.70	51.98	2.162	< 0.5	S
CD8+	30	56.40	71.37	10	175.30	67.95	2.666	< 0.05	S
CD4 : CD8	30	1.97	3.76	10	2.74	0.74	3.661	< 0.001	H.S.*

* H.S. = highly significance ** S = significant

Table 5 - showed after done the statistical analysis (unpaired "t" test) between the pandu Group-A and healthy control group-B) it can be concluded that T-lymphocyte subsets in terms to CD3, CD4, CD8 are established that the study is significant ($p < 0.002$). So, his lower level of CD3, CD4 and ratio of CD4:CD8 lymphocyte in subjects of pandu (iron deficiency anemia) may contribute to the decreased CMI in iron Deficiency. Pandu is the disease of Rasavahashrota where rasauja in terms of T-lymphocyte subsets get affected. So, the degree of the pandu (anemia) probably influenced the extent of immunological

compromise. Increased CD3, CD4, and CD8, ratio of CD4:CD8 lymphocytes in terms of rasauja at the end of drug administration period support the positive effect of iron in CMI.

DISCUSSION

The 30 individuals had iron deficiency anemia as per stipulated inclusion criteria. Ten healthy asymptomatic individuals selected from the Institution served as the control group.

Our observations that pandu (the iron deficient patients) had a significantly lower mean level of CD3 Lymphocytes as compared to the control group (healthy volunteers) were consistent with earlier reports. Kemhali *et al*¹⁷ Quantified the percentage of T lymphocytes and found it significantly lower in iron deficient compared to Control group. Berger *et al*¹⁸ evaluated ID patients and found that the number as well as percentage of mature T cells was lower as compared to controls. In this study, the CD3 counts were shown to be correlated with FEP (free erythrocyte protoporphyrin), MCV, Hb and serum iron. Among studies carried out on adults with iron deficiency lower levels of CD3 positive lymphocytes have been reported.

Our findings on lower CD3 lymphocytes in iron deficiency are consistent with these Authors. Moreover, with greater degree of anemia (Hb < 11 gm/dl) the CD3 levels were further decreased. We also observed a significantly lower level of CD4 lymphocytes in the iron deficient subjects. They observed decreased *in vitro* IL-2 production by lymphocytes of iron deficient subjects; while the numbers of Lymphocytes were noted to be similar in iron deplete and control group. However, the entire spectrum of Iron deficiency was not covered as only adult with Hemoglobin ranging from 9.00-11.0 gm/dl were included.

All subjects in our study were screened for chronic Disorders and infection and none had CRP levels > 3 mg/dl. While the authors have specified that the depressed IL-2 production persisted even after exclusion of subjects with laboratory signs of Inflammation, it is not clear if the lymphocyte analysis was also subject to this exclusion and thus the presence of inflammation as a confounding factor cannot be conclusively ruled out.

An interesting observation in our study was the Lower mean values of CD3 and CD4 lymphocytes within the iron deficiency group when adults with Hb < 11gm/dl. We observed a trend of lower CD3, CD4 and CD8 cells with increasing severity of pandu (iron deficiency anemia). The mean values of CD3, CD4 and CD8 lymphocytes in the former group were lower than the mean value in ID patient's whole. However, these, differences did not reach to statistical Significance, which may be due to small number of patients.

Administration of Shatavari Swarasa resulted in a significant improvement in the hematological Status of the patients. Shatavari possess Madhura and tikta rasa Snigdha and guru guna quality and having the ojaskara and rasayana effect¹⁹. In Panduroga the fundamental treatment is to administer snigdha Aushadh. The lymphocytes and cytokines, T and B lymphocytes are the backbone of immune system and modulation of Th1 /Th2 immunity. These are important biological targets for immunostimulant. Upon oral administration of the Shatavari Swarasa (plant's tubers juice) there has been significant and dose dependent increased CD3, CD4 and CD4:CD8 count and Th1/Th2 cytokines²⁰. Roots of Shatavari contains sarapogenine, shatavarin-IV, shatavoroside-A and B, vitamin-A, B2 and E and iron. Treatment with aqueous extract of root of Shatavari (*Asparagus racemosus*) resulted in significant increase of CD3 (+) and CD4/CD8 (+) suggesting its effect on T cell activation²¹. Thus, prevalence of anemia decreased, and the mean hemoglobin

improved. Administration of Shatavari was associated with an increase of CD3, CD4 and ratio of CD4: CD lymphocytes. This indicates that a greater hematological recovery may be needed for an Immunological improvement.

The CD4 lymphocyte level was found to rise significantly after therapy with oral drug administration. The level of CD8 lymphocytes remains largely unchanged after therapy, showing only a slight decrease.

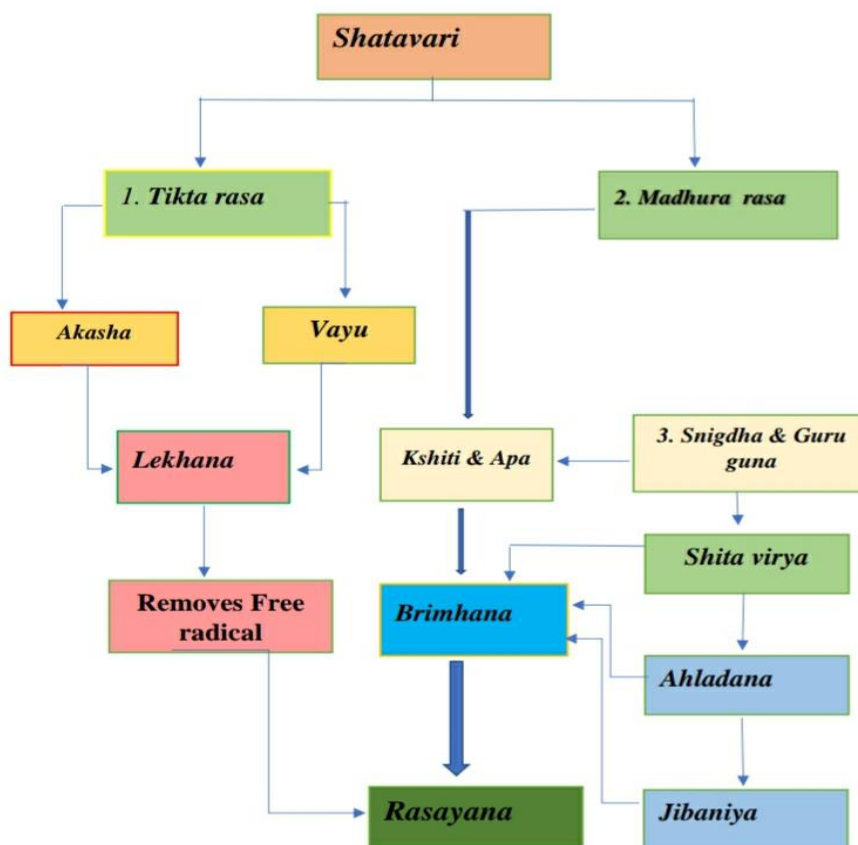
It is important to emphasize that immunological alterations observed in one study may or may not be observed in another, if strict criteria with respect to age groups, infection and malnutrition are not adhered to. Therefore, careful selection of study Groups and ensuring adequate comparability are essential for reliable results. Also, a larger number of patients, belonging to well defined age groups and different geographic areas need to be evaluated for these parameters in iron deficiency for a conclusive interpretation, especially since the normal values for Lymphocytes and lymphocyte subsets have a wide range, and cut-off values are difficult to establish. Analysis of more detailed immunological parameters such as helper T cell subsets may further elucidate the mechanism of lowered immunological Competence in pandu (iron deficiency).

CONCLUSION

Optimal state of Ojas leads to the maintenance of unctuous quality of body parts, holding body entities together and durability of body elements and maintenance of bulk of body, maintenance of sexual vigor and strength of body. Vikarvighatabhava is the phenomenon where vyadhikshamatva gets reduced because of affected of immune system. This Vyadhikshamatva is dependent on the presence of bala or Oja in the body. The function of oja is identically implied to the function of essential and nonessential amino acids and subsequently assay of CD4+, CD3+, CD8+, CD4:CD8 ratio reflects the functional state of amino acids as well as rasauja in specific. Shatavari has pharmaceutical effects to combat pandu as well as vyadhikshamatva (immune system). Roots of Shatavari contains sarapogenine, shatavarin-IV, shatavoroside-A and B, vitamin-A, B2 and E and iron. It also has the immunomodulatory, immunostimulant and immunoadjuvant-potential and antioxidant activity. Due to guru guna and snigdha guna, its acts against the vitiation of rasauja, then prevent the dushti of Rasavahashrota where the main alteration takes places in samprapti of Pandu. So, in this study it was revealed that Shatavari is very much effective to encounter the subjective manifestation of diseases Pandu by correcting the alteration of rasauja in respect to CD3+, CD4+, CD8+ & CD4:CD8 (ratio) level of cells suggesting its effects on T-cell activation.

ACKNOWLEDGEMENT

The authors sincerely extended their gratitude to the Department of Ayurveda Samhita and Siddhanta, Institute of Post Graduate Ayurvedic Education and Research at S.V.S.P Hospital, Kolkata, for supporting us. We are also thankful to all the individuals who participated in this study.



Probable mechanism of Shatavari

REFERENCES

1. Sushruta, Sushruta-Samhita, with the Nibandha-Samgraha commentary of Dalhana and Nyayachandrika Panjika of Shree Gayadas on Nidana sthana edited (from beginning to 9th chapter of Chikitsa sthana) by Vaidya Yadavji Trikamji Acharya and the rest by Narayana Ram Acharya "Kavyatirtha", Chaukhambha Orientalia, Varanasi (India), seventh edition, Sutra sthana, chapter-15, slok-21-22; 2002. p. 71.
2. Agnivesha, Charaka-Samhita, with the Ayurveda-Dipika commentary by Chakrapanidatta and edited by Vaidya Yadavji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi (India), reprint edition, sutra sthana, chapter-29, sloka-3; 2000. p. 181.
3. Agnivesha, Charaka-Samhita, with the Ayurveda-Dipika commentary by Chakrapanidatta and edited by Vaidya Yadavji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi (India), reprint edition, sutra sthana, chapter-30, slok-7; 2000. p. 184.
4. Agnivesha, Charaka-Samhita, with the Ayurveda-Dipika commentary by Chakrapanidatta and edited by Vaidya Yadavji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi (India), reprint edition, sutra sthana, chapter-17, slok-73-74; 2000. p. 103.
5. Agnivesha, Charaka-Samhita, with the Ayurveda-Dipika commentary by Chakrapanidatta and edited by Vaidya Yadavji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi (India), reprint edition, sutra sthana, chapter-28, slok-10; 2000. p. 179.
6. Shalini Mullick, Usha Russia, Meera Sikka, M Faridi, *et al.* Impact of Iron Deficiency Anaemia on T-Lymphocyte and Their Subsets In Children, the Indian Journal of Medical Research-124, publication-Research Gate, December 2006; 124: 647-654.
7. Agnivesha, Charaka-Samhita, with the Ayurveda-Dipika commentary by Chakrapanidatta and edited by Vaidya Yadavji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi (India), reprint edition, chikitsa sthana, chapter-16, slok-6; 2000. p. 427.
8. Madhavkar, Madhava Nidanam, Madhu Kosha Sanskrit commentary by Vijay Rakshita and Srikanta Dutta, Vidyotini Hinditikiya Nabin Vajjanika Vimarshana by Shri Sudarshana Shastri, edited by Ayurveda Acharya Yadunandana Upadhyaya, Prathama bhaga (Purvardha), Chaukhambha Sanskrit Bhawan, Varanasi, edition-reprint, Prathama bhaga, chapter-8, slok-2; 2016. p. 246-247.
9. Shalini Mullick, Usha Russia, Meera Sikka, Mma Faridi, *et al.* Impact of Iron Deficiency Anaemia on T-Lymphocyte and Their Subsets in Children, the Indian Journal of Medical Research-124, publication-Research Gate, December 2006; 124: 647-654.
10. G. H. Whipple, F.S. Robscheit-Robbins, *et al.* Amino Acids and Hemoglobin Production in Anemia, Journal of Experimental Medicine, published on- 1940; 71(4): 569-583.
11. Marichi Kasyapa, Kashyapa Samhita or Vruddha Jivakiya Tantra, edited by - Tewari PV, Chaukhambha Vishwa Bharati, edition-1st, sutra sthana, chapter-5, slok-13; 1996. p. 249.
12. Sastri J. L. N., Dravya guna Vijnana, Varanasi; edition-3rd, Chaukhambha Orientalia; 2009. p. 540-544.
13. Dr. Kama Chandra Reddy, Bhaishajya Kalpana Vijnana, edition-3rd, Chaukhambha Sanskrit Bhawan; 1998. p. 147.

14. Sastri J. L. N., *Dravya guna Vijnana*, Varanasi; edition-3rd, Chaukhambha Orientalia; 2009. p. 540-544.
15. Dr. Kama Chandra Reddy, Bhaishajya Kalpana Vijnana, edition-3rd, Chaukhambha Sanskrit Bhawan; 1998. p. 147.
16. Shasi Alok, Jain Kumar Sanjoy, Verma Amita, Kumar Mayank, Mahor Alok, Sabharwal Monika. Plant Profile, Phytochemistry and Pharmacology of *Asparagus racemosus* Wild. (Shatavari): A Review; Asian Pacific Journal of Tropical Disease; Published from ELSVIER 2013; Volume-3(3): 242-251.
17. Agnivesha, Charaka-Samhita, with the Ayurveda-Dipika commentary by Chakrapanidatta and edited by Vaidya Yadavji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi (India), reprint edition, chikitsa sthana, chapter-16, slok-12; 2000. p. 427.
18. Sushruta, Sushruta-Samhita, with the Nibandha-Samgraha commentary of Dalhana and Nyayachandrika Panjika of Shree Gayadas on Nidana sthana edited (from beginning to 9th chapter of Chikitsa sthana) by Vaidya Yadavji Trikamji Acharya and the rest by Narayana Ram Acharya "Kavyatirtha", Chaukhambha Orientalia, Varanasi (India), seventh edition, sutra sthana, chapter-15, slok-25-27; 2002. p. 71-72.
19. Agnivesha, Charaka-Samhita, with the Ayurveda-Dipika commentary by Chakrapanidatta and edited by Vaidya Yadavji Trikamji Acharya, Chaukhambha Surbharati Prakashan, Varanasi (India), reprint edition, Vimana sthana, chapter-8, slok-89; 2000. p. 275.
20. Shalini Mullick, Usha Russia, Meera Sikka, Mma Faridi, et al. Impact of Iron Deficiency Anaemia on T-Lymphocyte and Their Subsets in Children, the Indian Journal of Medical Research-124, publication-Research Gate, December 2006; 124: 647-654.
21. Shalini Mullick, Usha Russia, Meera Sikka, Mma Faridi, et al. Impact of Iron Deficiency Anaemia on T-Lymphocyte and Their Subsets in Children, the Indian Journal of Medical Research-124, publication-Research Gate, December 2006; 124: 647-654.
22. Late Prof. Chenukar, editor, Bhavamishra, Guduchyadi Varga, verse 187; Varanasi, Chaukhambha Bharati Academy, 2010, Guduchyadi varga, Drug no-3.66.1; slok -178-179; p. 110.
23. Gautam M, Saha S, Bani S, Kaul A, Mishra S, Patil D, Satti NK, Suri KA, Gairola S, Suresh K, Jadhav S, Qazi GN, Patwardhan B et al. Immunomodulatory activity of *Asparagus racemosus* on systemic Th1/Th2 immunity: implications for immunoadjuvant potential'2008, J. Ethnopharmacology 2009 Jan 21; 121 (2): 241-7 DOI: 10.1016/j.jep.2008.10.028. E-pub 2008 Nov 8.
24. Jaitak Vikas, Singha Ramit. Shatavari (*Asparagus racemosus* Wild); A review on its cultivation, morphology, phytochemistry and pharmacological importance' review article, International Journal of Pharmaceutical Sciences and Research, publication-2014, issued-3, Vol-V; 2014. p. 742-752.

How to cite this article:

Afroja Yeasmin Akhtar Roji et al. Studies on the concept of Oja and its evaluation in Rasavaha shrotodushti- A Prospective Randomized Cohort Study. J Pharm Sci Innov. 2020;9(5):113-120.
<http://dx.doi.org/10.7897/2277-4572.095180>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: JPSI is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publishing quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. JPSI cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of JPSI editor or editorial board members.