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Dhatrilauha: Right choice for iron deficiency anemia in pregnancy

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Abstract

Background: Anemia in pregnancy is multi-factorial. Iron deficiency anemia (IDA) is the most common one. Major cause is increased demand of iron during pregnancy. In Ayurveda, under *Pandu-Roga* the features of anemia are described. It is characterized by *Vaivarnyata* or *Varnanasha* (change/destruction in normal color of the body), a disorder of *Pitta* vitiation. Ayurvedic management is an effective way of curing anemia in general by a large number of *Lauha* preparations of which *Dhatrilauha* has been used widely for centuries. **Aim**: To evaluate the effect of *Dhatrilauha* in the management of IDA based on the scientific parameters among pregnant patients. **Materials and Methods:** A total of 58 cases were selected by simple randomized sampling method as per inclusion criteria of pregnant women between 4th and 7th months of pregnancy with a clinical diagnosis and laboratory confirmation of IDA. *Dhatrilauha* 500 mg in two divided doses after food with normal potable water were given for 45 days with three follow-ups, each of 15 days intervals. Final assessment was done after completion of 45 days and results were statistically analyzed by using Cochran's Q-test and Student's *t*-test. **Results:**. *Dhatrilauha* showed statistically significant ($P < 0.01$) improvement in the majority of sign-symptoms and objective parameters such as weakness, fatigue, palpitation, effort intolerance, breathlessness, heartburn, pallor, constipation, hemoglobin, red blood cells (RBC), hematocrit, mean corpuscular volume, mean corpuscular hemoglobin concentration, RBC distribution width, mean platelet volume, serum iron, and total iron binding capacity. **Conclusion:** *Dhatrilauha* possesses many fold effectiveness in anemia (IDA), which was evidenced with the significant results obtained in the majority of parameters in this study.

Key words: *Dhatrilauha,* hemoglobin, iron deficiency anemia, *Pandu Roga*, pregnancy

Introduction

Anemia is a qualitative or quantitative deficiency of hemoglobin (Hb) or red blood cells (RBC) in circulation leading to reduced oxygen (O_2) - carrying capacity of blood to organs and tissues. According to Indian Council of Medical Research, anemia is defined as Hb level of <11 g/dl, mild with Hb of 10–10.9 g/dl, moderate with Hb of 7–10 g/dl and severe with Hb of <7 g/dl.[1] Nutritional anemia is the most common due to increased demand of iron during pregnancy.[2] In healthy, iron-sufficient women, Hb concentrations change dramatically during pregnancy to accommodate the increasing maternal blood volume and the iron needs of the fetus.[3] It is one of the most commonly encountered medical disorders during pregnancy.[4] It is responsible for various adverse obstetric outcomes due to inability to cope with the stress of child birth.[1] Ranging from cardiac failure, puerperal sepsis, decreased lactation, preterm baby and low birth weight baby, etc.[5] National Anemia Prophylaxis Program revealed that the majority of women were not taking iron folic acid (IFA).[6] National Family Health Survey (3) showed that IFA coverage as only 57.60% of all pregnant women with 32% in Uttar Pradesh. Lack of effective implementation mechanisms and poor compliance due to ignorance or side-effects are the main impediments in effectiveness of iron supplementation during pregnancy.[6]

In Ayurveda, *Garbhini-Pandu* (anemia in pregnancy) has not been referred so far, but at one place *Kashyapa* stated that if a pregnant woman become weak and white complexioned, her fetus gets troubled.[7] This condition may simulate to anemia in pregnancy and its complication. In general, under *Pandu Roga* the features of anemia may be kept. The disease *PanduRoga* is called so because of the prominence of pallor in skin.[8,9]

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It has been vividly described with etiopathogenesis, clinical features, management, etc., in the ancient texts.[10,11] The *Pitta* predominant *Doshas* are vitiated in *Dhatus* and as a result of morbidity of *Dosha* and *Dushya* (those affected by *Dosha*), complexion, strength, unctuousness, and other properties of *Ojas* (*Rakta*, i.e. blood or *Ojas*, i.e. immunity itself get diminished[12]). Thus, it is affected with *Alparakta* (deficiency of blood), *Alpamedas* (deficiency of fat), *Nihsara* (diminished *Ojas*), *Shithilendriya* (looseness of body parts) and *Vaivarnya* (abnormality of complexion)[13] or vitiation of *Rakta* leads to paleness of skin.[14] *Hridya-Spandana* (palpitation), *Raukshya* (dryness of skin), *Sweda-Abhawa* (absence of sweat) and *Shrama* (exhaustion) are striking clinical presentations.[15] The ancient commentator stated that though *Pitta* and *Rakta* are similar in nature, aggravation of the *Pitta* does not lead to increase of *Rakta*, rather it is decreased because of depletion of the nutrient *Rasa* by *Pitta*. Similarly, *Pitta* responsible for complexion produces abnormal color when get vitiated.[16] In *Garbhini* (pregnant woman), the nutrient *Rasa* takes three courses - nourishment of her own body, for lactation and for growth of the fetus.[17,18] Thus, a *Garbhini* is more prone to suffer from *Pandu*, especially due to *Anuloma-Kshaya* of *Rasa Dhatu*. It also opined that in all types of *Pandu*, *Pitta* is the root cause.[19] The disorders of the pregnant woman should be treated with diet and drugs consisting of *Mridu Virya* (mild potency), *Madhura* (sweet), *Sheeta* (cold), etc., properties and which are non-contrary to fetus.[20,21] This implies that proper nutrition (*Poshya Rasa*) along with *Pitta* pacifying measures are the main stream of management in Ayurveda, a key to treat iron deficiency anemia (IDA) as in modern parlance too. Thus, Ayurvedic management with *Dhatrilauha*, which consisting of all the above-mentioned properties may be considered as an effective way of curing IDA in pregnancy.

Aim and objective

To evaluate the effect of *Dhatrilauha* in the management of IDA based on the scientific parameters among pregnant patients.

Materials and Methods

Selection of cases

Simple randomized allocation of the 58 pregnant patients selected on the basis of inclusion criteria after the ethical clearance of the research ethical committee of the Institute of Medical Sciences (IMS), Banaras Hindu University (BHU). The patients were selected from the outpatient department of Prasuti Tantra, Faculty of Ayurveda, Sir Sundarlal Hospital, IMS, BHU, Varanasi, Uttar Pradesh, India.

Selection of the test drug

Ayurvedic management is an effective way of curing anemia in general by a large number of *Lauha* preparations of which *Dhatrilauha* has been used widely for centuries.[22,23] *Dhatrilauha* was selected for two reasons in this study, firstly its classical indication in *Pandu Roga*, *Pitta-Roga* and secondly its ingredients which are nutritional, *Rasayana* (rejuvenating) and *Pitta Shamaka* (pacifying *Pitta*) in property. It consists of *Dhatri* (*Amalaki* – *Emblica officinalis* Gaertn.), *Yasthimadhu* (*Glycyrrhiza glabra* Linn.), *Guduchi* (*Tinospora cordifolia* (Willd) Miers. ex Hook. f. and Thoms.) and *Lauha Bhasma* (oxide of iron). All ingredients are having *Rasayana* property. *Dhatri* is *Tridoshahara*, specially *Pitta Shamaka*;[24,25] *Yasthimadhu* is *Madhura*, promotes strength and complexion, pacifies *Pitta*, *Rakta*[26] and mild purgative;[27] *Guduchi* is having *Tridoshahara* (pacifies *Vata*, *Pitta* and *Kapha*), *Balya* (strength promoting), *Pandu Nashaka* (cures anemia),[28] *Deepana* (appetizer), *Pachana* (digestive), *Krimighna* (anthelmintic) and *Rakta Vardhaka* (hematinic) properties.[29] *Lauha Bhasma* (*Lauha Rajas*) is said to be best *Pandu Roga Nashaka*,[30] *Tridoshahara*, found in many formulations for the treatment of *Pandu* and *Pitta Roga*.[31-33] Presence of ascorbic acid (vitamin C) in *Amalaki* has a significant effect on iron bioavailability from cereals and pulses *in vitro*.[34] *Lauha Bhasma* also has a significant hematinic and cytoprotective activity,[35] hemoglobin regeneration efficacy.[36]

Preparation of the test drug

Among the ingredients of the test drug *Amalaki*, *Yasthimadhu* and *Guduchi* in raw form were purchased from Goladinanath (local) Market, Varanasi. *Lauha Bhasma* was purchased from Dhootpapeshwar Pvt., Ltd., Mumbai. The test drug was prepared referring to *Bhaishajya Ratnawali* in the Ayurvedic Pharmacy, Department of Rasashastra, IMS; BHU, Varanasi, following standard operating procedure with due permission from the department concern.

Dose selection and drug schedule

The therapeutic dose in this study was calculated to 500 mg[37] in two divided doses after food with normal potable water were given for 45 days with three follow-ups, each of 15 days intervals. Final assessment was done after completion of 45 days and results were statistically analyzed.

Inclusion criteria

- Pregnant women between 4th and 7th month of pregnancy with a clinical diagnosis and laboratory confirmation of IDA, but Hb level is not <7 g/dl
- Hematological investigations suggestive of Hb level ≤10 g/dl. Peripheral blood picture showing microcytic, normocytic, and hypochromic type of erythrocytes.

Exclusion criteria

- Patients having Hb level ≤7 g/dl
- Patients with a history of anemia due to any bleeding conditions as bleeding piles, menorrhagia (excessive cyclic vaginal bleeding either in amount or duration), gastric ulcers etc
- Patients having bleeding disorders as coagulation defects, thalassemia, etc
- Presence of any other comorbid disease such as renal insufficiency, coronary heart disease, hypertension, tuberculosis, diabetes mellitus, etc.

Investigation

- Complete blood count
- General blood picture for RBC morphology
- Serum iron
- Total iron binding capacity (TIBC)
- Stool – ova and cyst.

Assessment of result

The patient was assessed after each follow-up statistically by using Cochran's Q-test and Student's *t*-test as required of the following parameters:

- The sign and symptoms (weakness, fatigue, palpitation, effort intolerance, breathlessness, heartburn, pallor, and constipation) were assessed before and after treatment with scoring pattern[37] depending on the severities
- The objective parameters (Laboratory investigations as Hb, RBC, Hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), RBC distribution width [RDW], rat parvovirus (RPV), serum iron, TIBC).

Scoring pattern on the sign and symptoms in IDA

I. Weakness (*Daurbalya*)

No feeling of weakness during the daily activit - 0
Sometimes feeling of weakness, but performs daily activity - 1
Often feels weakness, but hampers daily activity - 2
Always feels weakness, unable to perform daily activity even routine postural movements - 3

II. Fatigue (*Shrama*)

No fatigue except hard work - 0
Fatigue after moderate work for a certain period of time - 1
Fatigue after light work for a certain period of time - 2
Fatigue after routine work for a certain period of time - 3

(Hard work - weight lifting, excess work at the workplace or at home without rest, etc.; Moderate work - washing clothes and utensils, brooming, climbing stairs, cooking, etc.; Light work - walking, bathing, feeding, etc.)

III. Breathlessness (*Shwasa*)

No breathlessness - 0
Breathlessness after heavy work, relieved soon, tolerable - 1
Breathlessness after moderate work, relieved later, tolerable - 2
Breathlessness after light work, relieved later, intolerable - 3

IV. Pallor - Skin, face, sclera, nails (*Pandu Varna Twak* etc.)

Pallor absent in all these region - 0
Pallor present in any two region - 1
Pallor present in any three region - 2
Pallor present in these entire region - 3

Overall assessment of result

Overall effect on the sign - symptoms and objective parameters were calculated after the completion of 45 days therapy by the percentage of relief as shown below:

A. Complete remission of sign - symptoms: 100% relief
Marked improvement in sign - symptoms: ≥75–<100% relief
Moderate improvement in sign - symptoms: ≥50–<75% relief
Mild improvement in sign - symptoms: ≥25–<50% relief
No improvement in sign - symptoms: <25% relief.

B. Good improvement Hb percentage ≥ 1 g% gain.
Mild improvement Hb percentage ≥ 0.5–<1 g% gain.
No improvement Hb percentage ≤0.5 g% gain.

Observations

In the present clinical study, 13.8% of the patients were from the age group of 22 and 25 years, 69% were from the semi-urban area, 82.8% were housewife, 50% from lower socioeconomic condition, 84.5% literate, 34.5% were having a family member of 05, 27.6% had last delivery 2 years back. About 77.6% had a chief complaint of which 58.6% had duration of chief complain more than 6 month. 69% had regular bowel habit [Table 1]. In this study, 39.7% of patients were having *Pitta* predominant *Tridoshaja Prakriti* [Table 2].

Results

Dhatrilauha was found statistically significant in reducing the majority of sign-symptoms - weakness ($Q = 124.6$, $P < 0.001$), fatigue ($Q = 105.0$, $P < 0.001$), palpitation ($Q = 70.94$, $P < 0.001$), effort intolerance ($Q = 95.54$, $P < 0.001$), breathlessness ($Q = 92.35$, $P < 0.001$), swelling feet ($Q = 52.45$, $P < 0.001$), heartburn ($Q = 32.28$, $P < 0.001$), pallor ($Q = 143.2$, $P < 0.001$), and constipation ($Q = 46.6$, $P < 0.001$) [Table 3].

Table 1: Baseline features of the pregnant patients shown as highest percentage in that variable

Variables	Highest category	Percentage
Age (in years)	22 years and 25 years	13.8
Habitat	Semi-urban	69
Occupation	Housewife	82.8
Socioeconomic conditions	Lower	50
Education	Literate (own name at least)	84.5
Income per month	15,000	17.2
Number of family members	05	34.5
Parity	02	46.6
Abortion	00	72.4
Last delivery	2 years	27.6
Chief complain	Present	77.6
Duration of chief complain	>6 month	58.6
Diet	Vegetarian	84.5
Bowel	Regular	69
Sit with family for diet	No	84.5

Table 2: The *Prakriti* (body constituents) wise distribution of 58 patients with iron deficiency anemia in pregnancy

Prakriti type	Number of patients	Percentage
Vata Pradhana Tridoshaja	08	13.8
Pitta Pradhana Tridoshaja	15	39.7
Kapha Pradhana Tridoshaja	04	6.9
Vata-Pitta	23	25.9
Pitta-Kapha	04	6.9
Vata-Kapha	03	5.2
Sannipataja	01	1.7

On diagnostic parameters, it was found statistically highly significant in Hb (t = 10.22, P < 0.001), RBC (t = 5.14, P < 0.001), HCT (t = 9.64, P < 0.001), MCV (t = 10.05, P < 0.001), MCHC (t = 6.30, P < 0.001), RDW (t = 5.34, P < 0.001), mean platelet volume (MPV) (t = 4.96, P < 0.001), serum iron (t = 48.20, P < 0.001), TIBC (t = 19.10, P < 0.001). MCH (t = 0.088, P = 0.930) was found statistically insignificant [Table 4].

Overall therapeutic effect of the test drug [Figure 1] apart from Hb (g%) improvement was found that, out of 19 patients complaining of heartburn, 16 patients got relief and of 26 patients having constipation 24 patients got relief which were found statistically significant.

Discussion

Anemia in pregnancy is defined as a Hb concentration of <11 g/dL. However, in India and most of the other developing countries a lower limit of 10 g/dL is often accepted. It is considered to be the most commonly encountered medical disorder during pregnancy and is responsible for various adverse obstetric outcomes. Ineffective implementation, ignorance or side-effects of conventional iron are the main obstacles in effectiveness of iron supplementation.

Maximum patients were from the age group of 22 and 25 years, the age for the *Pitta* predominance. Prevalence of the condition among the lower socioeconomic group and in housewife may be due to the devotion only toward the family, no time for self-care, negligence and less education also unawareness toward self.

In Ayurveda, the fertile period of a female is considered normally *Pitta* predominant. Indulgence of *Pitta Vardhaka Ahara* (*Pitta* aggravating diets) such as *Amla* (sour), *Lavana* (salt), *Katu* (pungent), etc., by the pregnant female for fulfillment of *Dauhrid* (desirous intake) is further vulnerable to vitiate *Dhatus* by aggravated *Pitta*. Improper nourishment by *Ahara Rasa* to the *Garbhini* is also an important factor. Thus, prevalence of *Pandu* increases during pregnancy if proper care not taken of especially in relation to diets. In the present study, out of the 58 patients (39.7%) had *Pitta* predominant *Tridoshaja Prakriti* (constituents). Therefore, on the basis of observation and etiopathogenesis of *Pandu* in pregnancy, it could be said that IDA in pregnancy is more close to *Pitta* predominant *Tridoshaja Pandu*. In the pathogenesis, the involvement of *Dhatus*, especially depletion of the nutrient *Rasa* by vitiated *Pitta* predominant *Doshas* and subsequent malnourishment

Table 3: Effect of *Dhatrilauha* on sign and symptoms of iron deficiency anemia in pregnancy

Parameters	No. and percentage of cases (n=58)				Cochran's Q-test	P
	BT	F1	F2	F3		
Weakness	54	37	04	00	124.6	<0.001
Fatigue	45	12	03	00	105.0	<0.001
Palpitation	30	12	00	00	70.94	<0.001
Effort intolerance	43	15	5	00	95.54	<0.001
Breathlessness	43	34	11	01	92.35	<0.001
Swelling feet	25	20	06	02	52.45	<0.001
Heartburn	19	05	06	03	32.28	<0.001
Pallor	55	50	05	01	143.2	<0.001
Constipation	26	16	08	02	46.6	<0.001

BT: Before treatment, F1: Follow up after 15 days, F2: Follow up after 30 days, F3: Follow up after 45 days

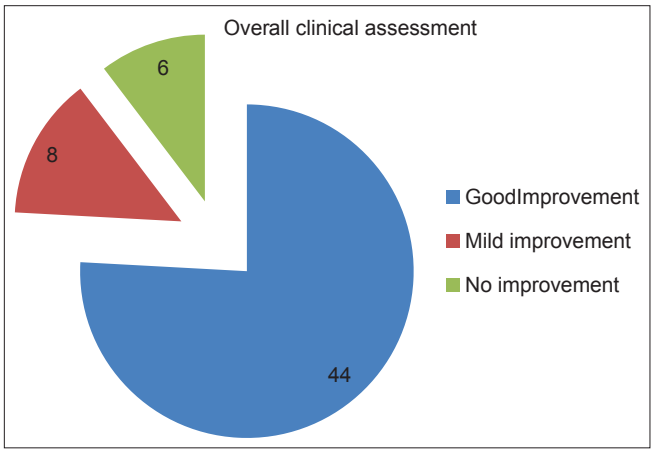

Figure 1: Graphical representation of overall improvement after treatment (F3)

Table 4: Effects on objective parameters of the test drug

Parameters	BT	F1	F2	F3	Diff. (BT–F3)	t	P
Hb	9.21±0.80	9.60±0.80	9.98±80	10.35±0.95	1.13±0.84	10.22	<0.001
RBC	4.20±0.72	4.28±0.67	4.50±0.52	4.60±0.54	0.40±0.59	5.14	<0.001
HCT	27.27±4.50	29.09±3.62	32.52±5.44	35.72±6.80	8.45±6.68	9.64	<0.001
MCV	78.03±5.26	79.43±4.49	81.29±5.13	84.56±5.20	6.53±4.95	10.05	<0.001
MCH	28.72±1.70	29.10±2.23	29.40±1.43	28.70±1.50	0.023±2.04	0.088	>0.05
MCHC	32.76±1.88	33.81±1.41	34.41±1.43	34.43±1.62	1.67±2.02	6.30	<0.001
RDW	16.15±1.35	16.03±1.04	15.27±1.30	15.07±1.11	1.07±1.53	5.34	<0.001
MPV	12.86±0.94	11.78±1.40	12.37±0.82	12.30±1.10	0.56±0.85	4.96	<0.001
Sr.Fe	30.21±8.90	-	-	121.38±14.66	91.17±14.41	48.20	<0.001
TIBC	518.36±108.82	-	-	271.78±52.32	246.59±98.33	19.10	<0.001

BT: Before treatment, F1: Follow up after 15 days, F2: Follow up after 30 days, F3: Follow up after 45 days, Hb: Hemoglobin, RBC: Red blood cell, HCT: Hematocrit, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, RDW: RBC distribution width, MPV: Mean platelet volume, Sr.Fe: Serum iron, TIBC: Total iron binding capacity

to successive *Dhatus* have a greater impact on the *Ojas* as stated in Ayurveda. The *Ojas* here taken either as blood or the immunity in general by the commentator of Charaka Samhita, Chakrapani. Thus, the principle depends on the two essential strategies namely the drugs those pacify *Pitta* and diets those nourishes *Rasa Dhatu*. Both components had been fulfilled by *Dhatrilauha* in this study.

All the ingredient of *Dhatrilauha* having *Tridoshhara*, *Rasayana* and *Rasa-Poshaka* (nutritional) properties may be considered the best to maintain the aggravated *Pitta*.[26-38] *Amalaki*, due to *Madhura Rasa* (sweet taste) and *Sheeta Virya* (cold potency) reduces *Pitta*[26,27] and thus breaks down the main factor in the pathogenesis of *Pandu Roga*. Further, it contains richest source of vitamin-C, which helps in the absorption of iron thus increases its bioavailability.[36] *Yasthimadhu*, due to *Varnya* (complexion promoting) and *Pitta* pacifying property[28,29] maintains the normal color of the skin. *Guduchi* being *Tikta Rasa* (bitter taste) increases appetite, *Krimighna* (anti helmentic) and effective against many infections.[30,31] *Lauha Bhasma*, the oxide of iron has a direct impact on bodily iron.[32-38] Thus, the double fold increase in the *Pitta* aggravation (due to fertile age and *Dauhrid*) in pregnancy, *Dhatrilauha* possesses many fold effectiveness in anemia (IDA). This is evidenced with the significant results obtained in the majority of parameters in this study.

The *Dhatrilauha* was found statistically significant in increasing the Hb level, serum iron and reducing the value of TIBC. Totally 19 patients having complained of acidity, heartburn-related to the gastrointestinal system, of which 16 got relief. A total of 26 patients having constipation, and 24 were relieved from the symptom, may be considered as few advantages over the conventional iron therapy. It showed good tolerability with high acceptance to the pregnant patient without any reported untoward effect.

This work was aimed at providing a new dimension for future large population and multicenter study in the cases of pregnancy anemia so as to utilize this excellent classical drug as a part of National anemia control program to benefit the nation and also to avoid the untoward effect of contemporary iron preparations.

Conclusion

Iron deficiency anemia in pregnancy may be considered under the preview of *Pitta Pradhana Pandu Roga* in Ayurveda. In this study, a total of 58 pregnant patients were studied with *Dhatrilauha* and found effective in relieving the majority of sign-symptoms and objective parameters Hb, RBC, HCT, MCV, MCHC, RDW, MPV, serum iron, TIBC. The drug showed good tolerability with high acceptance to the pregnant patient without any reported adverse drug reaction.

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हिन्दी सारांश

धात्री लौह–गर्भिणी पाण्डु में एक सही उपाय

अनुराधा राय, मंजरी द्विवेदी

पाण्डु गर्भावस्था में पाया जाने वाला एक सामान्य विकार है। गर्भ एवं गर्भिणी द्वारा लौह की आवश्यकता बढ़ जाना तथा उचितमात्रा में इसका सेवन आहार एवं औषध के रूप में गर्भिणी स्त्री द्वारा न करना, गर्भिणी पाण्डु के मुख्य कारण है। धात्री लौह के घटकों का विश्लेषण से यह पता चलता है कि इसमें आहार पोषकतत्व के साथ साथ लौह की वह मात्रा है जिसका औषधीय प्रयोग गर्भिणी पाण्डु में प्रभावकारी है। प्रस्तुत अध्ययन में ५८ पाण्डु से पीडित गर्भिणी स्त्री को नैदानिक परिक्षण के आधार पर पंजीकृत करके, धात्री लौह ५०० मि.ग्रा. दिन में दो बार सामान्य जल से भोजनोपरान्त दिया गया तथा निर्देशित मापदण्ड के आधार पर परिणामों का सांख्यिकी अध्ययन किया गया। प्राप्त परिणाम से सिद्ध हुआ कि धात्री लौह गर्भिणी पाण्डु में प्रभावशाली एवं कुप्रभाव रहित है।