A COMPARATIVE CLINICAL STUDY TO EVALUATE THE EFFECT OF TANDULIYAKA IN GARBHINI PANDU W.S.R. TO ANAEMIA DURING PREGNANCY

Singh Ritu*, Singh D.C2, Tomar Pravesh3

*1M.D. Scholar, 2Professor and H.O.D., P.G. Department of Dravyaguna, Rishikul Campus, Uttarakhand Ayurved University, Uttarakhand, India.
3Associate Professor, P.G. Department of Prasuti Tantra evam Stri Roga, Rishikul Campus, Uttarakhand Ayurved University, Uttarakhand, India.

ABSTRACT

Under-nutrition and micronutrient deficiencies are widespread and affect mainly women and children. To address these problems, increased consumption of leafy vegetables is promoted as sources of both micronutrients and bio-active compounds. Widely promoted leafy vegetables include *Amaranthus* sp., Species of this genus are used as pseudo-cereals in Europe and America, and are mostly planted as vegetables in Africa. *Amaranthus* has been rediscovered as a promising food crop mainly due to its resistance to heat, drought, diseases and pests, and the high nutritional value of both seeds and leaves. Leaves are rich in proteins and micronutrients such as iron, calcium, zinc, vitamin C and vitamin A. Pregnancy induces some physiological changes that often confuse the diagnosis of several disorders and the assessment of the suitable treatments. This is especially true in case of anaemia. The World Health Organization estimates that 58% of pregnant women in developing countries are anaemic. The two most common causes of anaemia during pregnancy are iron deficiency and acute blood loss. Iron deficiency anaemia is the most common nutritional disorder in the world that affects particularly women of reproductive age. In the present study *Amaranthus* capsules showed significant improvement in terms of subjective parameters like Panduta, *Hrid-drava*, Shrama, Swasa, Aruchi, as well as objective parameters like Hb%, MCV, PCV, RBC etc. This study has revealed that *Amaranthus* capsules provided statistically significant improvement in the cardinal features of GARBHINI PANDU as well as it has showed good effect on jatharagni and nourishment of pregnant women and foetus without any side-effects, due to its properties like Deepana, Pachana, and high nutritional value.

KEYWORDS: Garbhini pandu, *Amaranthus viridis*, IDA, Nutritional deficiency.

INTRODUCTION

In present day unwholesome food habits are influencing deficiencies of vital nutrients and leads to nutritional disorders. The disease Pandu roga that is dealt in all Ayurvedic texts with its treatment which is very much similar to anaemia in later period. Pandu, is a disease characterized by pallor of body which strikingly resembles with ‘Anaemia’ of modern science, reduction in number of Rbc’s per cumm of blood and quantity of Hb resulting in pallor like other symptoms.

*Rakta* has been considered as a key factor for the Jeevana, Prinana Dharana and Poshana karma of the body. Many a times it is seen that Rakta gets vitiated by Doshas, mainly by Pitta dosha as Rakta is Pittavargiya and disease like Pandu appear[3]. In Ayurveda, Pandu is considered as a specific disease with its own pathogenesis and treatment (Cha.Chi.16,Su.Utt. 44). Though there is no direct reference of Garbhini pandu in Ayurvedic classics but term Varna hani in Garbhini resembles closely Panduroga, which is considered as Pitta dosha pradhan. Acharya Charaka in Sharira sthana has explained about Bala varna hani of Garbhini in 6th month of pregnancy. It can be considered as reference for Garbhini pandu [3]. There is a significant role of Pitta in Varna uttaptti, and Acharya Charaka has quoted that Pitta dosha is very important substance in natural colour of body, and if Pitta gets vitiates the normal color of body and other sites of body turns into Pandu, Haridra and Haritadi varnas. [3]

The prevalence of anaemia among women has been reported to be 50% while among men it is 44.3% but prevalence of mild anaemia was higher (men 29.3%; women 32%) than moderate and severe anaemia. However younger women (<30 years) have been shown to have higher prevalence of anaemia (55%)[4]. According to World Health Organisation (WHO), If the prevalence of anaemia at community levels is >40%, then it should be considered a public health care problem of high magnitude[5]. Also globally >468 million non-pregnant women suffer from anaemia; of these 388 million are from developing regions of the world and rest of them are from Europe and the America [6]. In a study conducted by Ansari et al, in 65.2% women with a history of pregnancy, 24.71% females had their first pregnancy before the age of 20 years, 68.96% females were multipara and 62.06% of those with an inter-pregnancy interval of <1year had IDA. The researchers also reported that 34.8% patients with no history of pregnancy had iron deficiency anaemia.

Iron Status During Pregnancy: Setting the stage of mother and infant- Supplementation with iron is generally
recommended during pregnancy to meet the iron needs of both mother and fetus. When detected early in pregnancy, IDA is associated with a 2-fold increase in the risk of preterm delivery. During the third trimester, maternal anaemia usually is not associated increased risk of adverse pregnancy outcomes and may be an indicator of an expanded maternal plasma volume. High levels of Haemoglobin, Hematocrit and ferritin are associated with an increased risk of fetal growth restriction, preterm delivery, and preeclampsia. While iron supplementation increases maternal iron status and stores, Factors that underlie adverse pregnancy outcome are considered to result in this association, not iron supplements. On the other hand, Iron supplements and increased iron stores have recently been linked to maternal complications (Eg.- Gestational Diabetes) and increased oxidative stress during pregnancy. In Pregnancy, nutrition is used for nourishment of Garbhini, her foetus, placenta and breast. So nutritional requirements are high during pregnancy [7]. Which if not fulfilled, lead to deficiency disorders like Iron deficiency anaemia (I.D.A).

Material and Methods

Study Design- Open level, controlled clinical trial with pre and post test design.

Drug Source- The required herbal formulation was prepared specially for the study in Rishikul Campus, Haridwar, UAU.

Method of collection of Data

Drug Source: Tanduliyaka plant was collected from Rishikul campus and from Rajrajeshwari herbal garden.

Patient source: Pregnant women suffering from Panduroga (IDA) were registered from OPD and IPD of Rishikul Ayurvedic College and District Women hospital Haridwar.

Sample Size: Minimum of 40 pregnant women fulfilling the diagnostic criteria as well as inclusion criteria of Panduroga irrespective of their cast, religion, socio-economic status, education, etc. were selected for the study.

Preparation of Tanduliyaka Ghan

Ghana Kalpana, a second derivative preparation of Kwatha Kalpana, is one of the extraction methods in which water soluble material is extracted by Kwatha method and reheated till it is converted into concentrated solid form.

Method of Preparation

The authenticated drug (Amaranthus viridis) was crushed to a coarse particle separately and then mixed thoroughly with 8 parts of water in a stainless steel container and then continuous mild heat was applied until it was reduced to one-fourth of its initial quantity.

During the heating process, continuous stirring was done to facilitate the evaporation and avoid any deterioration due to burning of materials. After a desirable reduction in volume was achieved, the Kwatha was filtered through single folded cotton cloth and collected in a separate vessel.

Then, the Kwatha was boiled again over slow fire on a gas stove, maintaining the temperature between 90°C and 95°C till a semisolid consistency is obtained. As the water evaporates, the viscosity of the extract increases, resulting in Ghana form. Then the Ghana was dried in dryer at the temperature of 65°C.

After this powder is prepared from dried Ghana.

Then this powder is filled into capsules of 500mg.

Figure 1: Step-wise preparation of Amaranthus Ghana

<table>
<thead>
<tr>
<th>Test parameters</th>
<th>Results</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Ash Value</td>
<td>29.13%</td>
<td>API 2008</td>
</tr>
<tr>
<td>Acid insoluble Ash</td>
<td>1.70%</td>
<td>API 2008</td>
</tr>
<tr>
<td>Water soluble Ash</td>
<td>22.68%</td>
<td>API 2008</td>
</tr>
<tr>
<td>Loss on drying</td>
<td>7.48%</td>
<td>API 2008</td>
</tr>
<tr>
<td>pH Value (5% w/v)</td>
<td>5.16</td>
<td>API 2008</td>
</tr>
<tr>
<td>Fat Content</td>
<td>0.504%</td>
<td>API 2008</td>
</tr>
</tbody>
</table>

Available online at: http://ijapr.in
Singh Ritu et al. Clinical study to Evaluate the Effect of Tanduliyaka in Garbhini Pandu w.s.r to Anaemia during pregnancy

<table>
<thead>
<tr>
<th>Water soluble Extractive</th>
<th>92.46%</th>
<th>API 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol soluble Extractive</td>
<td>43.88%</td>
<td>API 2008</td>
</tr>
<tr>
<td>Folic acid Content</td>
<td>20 mg /100 gm</td>
<td>In House</td>
</tr>
<tr>
<td>Iron content</td>
<td>61.58 mg/100 gm</td>
<td>In House</td>
</tr>
<tr>
<td>Calcium Content</td>
<td>0.44% w/w</td>
<td>In House</td>
</tr>
<tr>
<td>Sodium Content</td>
<td>2.867 mg/ 100 gm</td>
<td>In House</td>
</tr>
<tr>
<td>Potassium Content</td>
<td>40.002mg/100 gm</td>
<td>In House</td>
</tr>
<tr>
<td>Zinc Content</td>
<td>5.122mg/100gm</td>
<td>In House</td>
</tr>
<tr>
<td>Chromium Content</td>
<td>0.00364mg/100gm</td>
<td>In House</td>
</tr>
<tr>
<td>Magnesium Content</td>
<td>0.56 % w/w</td>
<td>In House</td>
</tr>
</tbody>
</table>

Selection criteria

Diagnostic criteria

Complete blood culture
1) T.L.C.
2) D.L.C.
3) E.S.R.
4) ABO Rh
5) Hb % - Less than 4 million/cumm
6) PCV - Less than 30%
7) MCV - Less than 75 μ m³
8) MCH - Less than 25 pg
9) MCHC- Less than 30%
10) VDRL
11) HbsAg
12) Serum Fe (Normal value 50-150 μg/dl)
13) TIBC (Normal value 300-360 μg/dl)
14) Seerum Ferritin (Normal value 50-150 μg/dl)
15) Red cell porphyrin level (Normal valve 30 μg/dl)
16) Stool testing
17) Urine (routine and microscopic)

Inclusion Criteria
- Fulfilling the diagnostic criteria.
- Age group between 20-35 years.
- Gestational age between 16 weeks to 24 weeks.
- Primigravida
- Haemoglobin below 10gm% and above 6gm%.
- Blood picture with microcytic hypochromia and normocytic hypochromia.

Exclusion Criteria
- Cases of Anaemia other than iron deficiency anaemia like thalassemia, Sickle cell anaemia, Pernicious anaemia.
- Haemolytic anaemia, Aplastic anaemia.
- Anaemia associated with bleeding piles and other bleeding disorders.
- Multiple pregnancy.
- High risk cases of Preeclampsia, Gestational diabetes, Metabolic disorders, Diabetes, Jaundice etc.
- Other medical disorders.
- Drug allergy.

Assessment Criteria
All the data was collected and documented as a detailed case performa. Assessment of the disease was done adapting standard methods of scoring. Subjective and objective parameters were analysed statistically.

Subjective parameters
- Dourbalya (generalized weakness)

Aruchi (Loss of appetite)
Arohanayasa (Exertional dyspnoea)
Angamarda (Fatigue)
Hriddraya (Palpitation)
Shiroruya (Headache)
Pandutva of Netra, Nakha (Pallor)
Rukshangata (Dryness)
Shotha (oedema)
Alasya (Lassitude)

Objective parameters
- Haemoglobin (Hb%)
- Red blood cell count (RBC Count)
- Haematocrit (Hct/PCV)
- Mean corpuscular volume (MCV)
- Mean corpuscular haemoglobin (MCH)
- Mean corpuscular haemoglobin concentration (MCHC)

Grading of subjective parameters
Changes in patients status were noted and following points were taken into considering for assessment of results. To assess the effect of therapy objectively, all the signs and symptoms were given scoring pattern depending upon their severity as below:

1. Panduta
   - In - Twaka, Nakha, Netravartma, Jihva, Hastapadata
     - Absent - 0
     - In any 2 of these - 1
     - In any 3 of these - 2
     - In any 4 of these - 3
     - In all - 4

2. Daurbalyata
   - Not Present - 0
   - After heavy work, relieved soon & tolerate - 1
   - After Moderate work relieved later & tolerate - 2
   - After little work relieved later - 3
   - After little work relieved later but beyond tolerate - 4

3. Hridspandanam
   - Not Present - 0
   - After heavy work, relieved soon & tolerate - 1
   - After Moderate work relieved later & tolerate - 2
   - After little work relieved later - 3
   - After little work relieved later but beyond tolerate - 4
   - Hridayspandanam even in resting condition - 5

4. Bhrama
   - Not Present - 0
   - After heavy work, relieved soon & tolerate - 1
   - After Moderate work relieved later & tolerate - 2
After little work relieved later - 3
After little work relieved later but beyond tolerate - 4
Bhrama even in resting condition - 5.

**5. Shunakshikuta shotha**
Absent - 0
Mild - 1
Moderate - 2
Severe - 3

**6. Rukshata**
In - Twaka, Nakha, Netravartma, Jihva, Hastapadata
Absent - 0
In any 2 of these - 1
In any 3 of these - 2
In any 4 of these - 3
In all - 4

**7. Swasha**
Not Present - 0
After heavy work, relieved soon & tolerate - 1
After Moderate work relieved later & tolerate - 2
After little work relieved later - 3
After little work relieved later but beyond tolerate - 4
Swasha even in resting condition - 5

**8. Aruchi**
Normal instinct of taking food - 0
Person even dislikes the touch or smell of food - 1
Though the person is hungry he had dislike for food
Due to fear, anger etc - 2
Person doesn’t like to take food due to Sharira/Manas doshas - 3

**9. Pindikodweshtanam**
Absent - 0
After heavy work - 1
After moderate work - 2
Only at night but beyond tolerate - 3
Whole day, severe, require medicine - 4

**10. Jwara**
No - 0
Occasional - 1
Daily once - 2
Constant - 3

### Table 2: Grading of Objective parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Erythrocyte Count</td>
<td></td>
</tr>
<tr>
<td>&gt; 4.2 million</td>
<td>Grade 1</td>
</tr>
<tr>
<td>4.2- 5.4 million</td>
<td>Grade 2</td>
</tr>
<tr>
<td>&lt; 4.2 million</td>
<td>Grade 3</td>
</tr>
<tr>
<td>2. PCV</td>
<td></td>
</tr>
<tr>
<td>&lt;33%</td>
<td>Grade 1</td>
</tr>
<tr>
<td>33%- 38%</td>
<td>Grade 2</td>
</tr>
<tr>
<td>&gt;38%</td>
<td>Grade 3</td>
</tr>
<tr>
<td>3. Mean Corpuscular Volume</td>
<td></td>
</tr>
<tr>
<td>&gt; 70-90 cu μ/ cell</td>
<td>Grade 1</td>
</tr>
<tr>
<td>70-90 cu μ/ cell</td>
<td>Grade 2</td>
</tr>
<tr>
<td>&lt; 70-90 cu μ/ cell</td>
<td>Grade 3</td>
</tr>
</tbody>
</table>

### Observations

Out of 40 patients registered for the study maximum patients (56.66%) were in age group 18-25 years. And 56.66% were Muslims. Out of 40 patients 50.00% belonged to lower class. 56.66% were house wives, 36.66% were completed their secondary education. 51.00% belonged to urban habitat. 33.33% had Tikshnagni. Whereas 36.66% had Madhyama Koshtha. 46.66% were having disturbed sleep. 43.33% were performing mild physical work. 73.33% were not doing any exercise. 43.33% had Vata-Pitta Prakriti. 30.00% had joyful emotional status. 53.33% were having Madhyam vyayam shakti. And 46.66% had regular bowel habit. All registered patients were having complaints of Daurbalya, Aruchi, Hridrava and Panduta.

### RESULTS

Patients suffering from Garbhini pandu / IDA were treated with two Amaranthus viridis capsules 500mg thrice a day with lemon water for 90 days in this randomized controlled clinical trial study.

### Table 3: Demographic Presentation

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Observation</th>
<th>Maximum</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td>Vivardhaman</td>
<td>17</td>
<td>56.66</td>
</tr>
<tr>
<td>2.</td>
<td>Socio-economic</td>
<td>Lower class</td>
<td>15</td>
<td>50.00</td>
</tr>
<tr>
<td>3.</td>
<td>Religion</td>
<td>Muslims</td>
<td>17</td>
<td>56.66</td>
</tr>
<tr>
<td>4.</td>
<td>Occupation</td>
<td>House wife</td>
<td>16</td>
<td>53.33</td>
</tr>
<tr>
<td>5.</td>
<td>Appetite</td>
<td>Poor</td>
<td>11</td>
<td>36.66</td>
</tr>
<tr>
<td>6.</td>
<td>Kostha</td>
<td>Madhyam</td>
<td>11</td>
<td>36.66</td>
</tr>
<tr>
<td>7.</td>
<td>Nature of work</td>
<td>Mild</td>
<td>13</td>
<td>43.33</td>
</tr>
<tr>
<td>8.</td>
<td>Sleep Pattern</td>
<td>Disturbed</td>
<td>14</td>
<td>46.66</td>
</tr>
<tr>
<td>9.</td>
<td>Agni</td>
<td>Tikshna</td>
<td>10</td>
<td>33.33</td>
</tr>
</tbody>
</table>

### Table 4: Observations of Clinical features

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Clinical features</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Panduta</td>
<td>09</td>
<td>30%</td>
</tr>
<tr>
<td>2.</td>
<td>Daurbalya</td>
<td>08</td>
<td>26.66%</td>
</tr>
<tr>
<td>3.</td>
<td>Hridspandana</td>
<td>03</td>
<td>10%</td>
</tr>
<tr>
<td>4.</td>
<td>Shrama</td>
<td>03</td>
<td>10%</td>
</tr>
<tr>
<td>5.</td>
<td>Swasa</td>
<td>01</td>
<td>3.33%</td>
</tr>
<tr>
<td>6.</td>
<td>Aruchi</td>
<td>06</td>
<td>20%</td>
</tr>
</tbody>
</table>
The obtained results were interpreted as:

- Not significant P > 0.05
- Significant P < 0.05
- Very Significant P < 0.01
- Extremely significant P < 0.001

**Effect on Subjective and objective parameters**

In the present study, we gave capsule A.V. to the patients. Results showed statistically significant improvement in both subjective and objective parameters. The effect of the drug leads to improvement of metabolism, RBCs production, minerals consumption in body and relief from the disease. The most important presenting sign of *Pandu roga* is *Panduta* or Pallorness where luster of the skin is lost. This sign is the most conclusive sign of the disease because whenever any patient comes across, the thing first observed is the appearance. Regarding the effect of therapy, extremely significant results seen in patients (p < 0.001).

The reason of *Daurbalya* may be the debility of *Dhatukshaya*, *Ojakshaya* as well as *Raktalpata*. If we consider it from modern point of view, the cells in the blood are responsible for oxygen supply to body tissues. Regarding the effect of therapy, results were extremely significant (p < 0.001).

*Ayasaja swasa* is observed in anaemic patients due to *Raktalpata*. But the reason for very significant results may be due to high nutritional value of *Amaranthus*. During pregnancy there is need of extra calories for developing foetus. *Amaranthus* provide nourishment to the body due to presence of other minerals.

The cause of nausea and vomiting in pregnancy is currently unknown. Studies have suggested that nausea and vomiting in pregnancy might be due to hormones, evolutionary adaptation or psychological causes. The relief was very significant in patients (p value < 0.01). This may be due to high protein and complex carbohydrates present in *Amaranthus* which might be specially helpful in digestion.

The objective parameters i.e. HB%, RBC, MCV, MCHC, results after treatment were found statistically significant. Whereas the results of PCV, WBC, showed statistically insignificant results.

**DISCUSSION**

*Amaranthus* has been rediscovered as a promising food crop mainly due to its resistance to heat, drought, diseases and pests, and the high nutritional value of both seeds and leaves[8]. Quantity and quality of proteins of *Amaranth* are superior to that of wheat. It also contains higher concentration of Folic acid with respect to wheat and its fibers and minerals content are higher to other cereals. Iron-rich (5 times that of wheat) amaranth leaves promote coagulation and increase hemoglobin content and red blood cell counts. High dietary fiber content (3 times that of wheat) in this improves digestive health and reduces constipation. It is easily digestible and good for both young ones and elders [9].

In all types of *Pandu*, *Pitta* is the root cause. The disorders of the pregnant woman should be treated with diet and drugs consisting of *Mridu Virya* (mild potency), *Madhura* (sweet) *rusa*, *Sheeta* (cold) *Vipaka* etc., properties and which are non-contrary to fetus [10]. 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 *Tanduliyaka*, which consisting of all the above-mentioned properties may be considered as an effective way of curing IDA in pregnancy. *Tanduliyaka* is selected for the study because of easy availability, less expensive and *Deepana* (appetizer) *Pachana* (digestive), *Srotoshodhaka* (channel cleanser), *Vishaghna* (one which increases immunity), and *Balya* (one which increases strength).

**CONCLUSION**

*Grabhini pandu* (IDA) can be considered as a *Rasapradoshaja vikara*, which is common in *Garbhavastha*
Anupana of the prepared drug, and also helps of Foods and Nutrition. 1. REFERENCES 2. The effect of the drug leads to improvement of metabolism, RBCs production, minerals consumption in improvement in both subjective and objective parameters. of Amaranthus capsules showed statistically significant during pregnancy continues to be a major health problem in India. To eradicate it certain steps can be taken at individual and community level like education of the women as regards anaemia, its causes and health implication. Garbhini is more prone to suffer from PANDU, especially due to Anuloma-Kshaya of Rasa Dhatus. Normally during pregnancy, erythroid hyperplasia of the marrow occurs, and RBC mass increases. However, a disproportionate increase in plasma volume results in hemodilution (hydremia of pregnancy). Amaranth leaves are rich in easily absorbed calcium, on the teeth and bone myocardial activity, prevent muscle spasms. While rich in iron, calcium, and vitamin K, can promote blood clotting, increasing the oxygen carrying capacity of hemoglobin content and improve, promote hematopoietic function. Tanduliyaka capsules were administered with lemon water, as the vehicle (Anupana). which enhances the medicinal qualities of the prepared drug, and also helps Ghana to reach the deeper tissues. Vitamin C (ascorbic acid) is also a powerful enhancer of iron absorption. Effect of Amaranthus capsules showed statistically significant improvement in both subjective and objective parameters. The effect of the drug leads to improvement of metabolism, RBCs production, minerals consumption in body and relief from the disease.

REFERENCES

Cite this article as:

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

*Address for correspondence
Dr. Ritu Singh
Research Scholar
M.D. Final Year
P.G. Department of Dravyaguna
Contact no. 9458352951
Email: rsraghuvanshi1989@gmail.com

Available online at: http://ijapr.in