



Research Article

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A CLINICAL STUDY ON THE EFFICACY OF GARBHINI KSHEERAPAKAS FOR GARBHA POSHANA DURING THE THIRD TRIMESTER OF PREGNANCY

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ABSTRACT

Background: Pregnancy requires holistic care to ensure maternal and fetal well-being. Ayurveda's Garbhini Paricharya provides comprehensive antenatal care through diet, lifestyle, and formulations to balance Dosha, Dhatu, and Mala, aiding adaptation to pregnancy's physiological changes. This approach reduces complications like pre-eclampsia and malnutrition while ensuring fetal growth through nourishment (Garbha Poshana). The final trimester places increased nutritional demands on the mother, and Garbhini Ksheerapakas, as recommended in Ayurvedic classics like Sahasrayogam and Arogyakalpadruma, address these needs effectively. **Objective:** To evaluate the efficacy of Garbhini Ksheerapakas versus standard Iron and Calcium supplements for Garbha Poshana during the 7th, 8th, and 9th months of pregnancy based on WHO antenatal care recommendations. **Materials and methods:** A randomized clinical study was conducted on 30 pregnant women (gestation ≥ 24 weeks) attending the OPD of Prasuti Tantra and Stree Roga at Sri Sri College of Ayurvedic Science and Research Hospital, Bengaluru. Participants were assessed for subjective and objective parameters until post-delivery. **Results:** Group A (Garbhini Ksheerapakas) showed significant improvement in fatigue ($p < 0.001$), pedal oedema ($p < 0.05$), backache ($p < 0.05$), and Anga Gourava ($p < 0.05$). Objective measures like maternal weight gain ($p < 0.001$), abdominal circumference ($p < 0.001$), symphysial fundal height ($p < 0.001$), haemoglobin ($p < 0.05$), obstetric scans, birth weight ($p < 0.05$), and lactation also favoured Group A. **Conclusion:** Garbhini Ksheerapakas proved superior to standard Iron and Calcium supplementation, addressing comprehensive maternal needs, and improving maternal and fetal outcomes during the third trimester.

Keywords: Garbhini Paricharya, Ksheerapakas, Antenatal Care, Pregnancy, Garbha Poshana

INTRODUCTION

Pregnancy is a transformative phase requiring utmost care to ensure the health of both mother and baby. A recent national survey in India estimated 1.3 million maternal deaths over two decades.¹ Ayurvedic classics have given foremost importance to pregnant women as they are undergoing various anatomical and physiological changes at the level of Dosha, Dhatu, and Mala during this period.² Maternal health in Ayurveda is maintained through Garbhini Paricharya (Antenatal regimen), a structured regimen of diet, lifestyle, and Ayurvedic formulations. It includes Masanumasika Pathya (month-wise guidelines), Garbhasthapaka Dravyas (pregnancy-supporting drugs), and advises avoiding Garbhopaghatakara Bhavas (factors harmful to the fetus). Acharya Charaka emphasizes on importance of Garbha Poshana where the Ahara Rasa formed from diet taken by the pregnant woman has three major functions- Nourishment of the mother, Formation of breast milk and development of foetus.³ In this study, primary focus is given on the 7th, 8th and 9th month as there is increased nutritional demand by the foetus, because of which the pregnant woman becomes exceedingly deficit in all aspects of her health.

Sahasrayogam and Arogyakalpadruma are two important Ayurvedic texts which have exclusive references on Garbhini Ksheerapakas.^{4,5} As per this reference, different drugs in the form of Ksheerapaka (medicated milk decoction) are advocated month-wise throughout pregnancy. In the 7th month, Yava Siddha

Ksheerapaka, followed by Morata Siddha Ksheerapaka in the 8th month and Shatavari Siddha Ksheerapaka in the 9th month are administered as part of Garbhini Paricharya. Additionally, Bruhatrayees have mentioned milk as an important dietary regimen during pregnancy.⁶ These Garbhini Ksheerapakas have added benefit of the effect of drug along with milk to prevent or relieve ailments which are commonly encountered during the last trimester of pregnancy like pedal oedema, backache due to lordosis, constipation and prevent complications like diabetes, eclampsia, pre-term labour etc. It also contributes to adequate foetal growth and development and prepare the woman eventually for normal delivery and a congenial post-partum period. This study intends to underscore the therapeutic potential of Garbhini Ksheerapakas in addressing third-trimester challenges and promoting optimal maternal and fetal outcomes. Its simplicity, cost-effectiveness, and alignment with Ayurveda's holistic approach make it a promising contribution to obstetric care.

Objectives of the study

- To evaluate the efficacy of multimodal clinical management with Yava Siddha Ksheerapaka, Morata Siddha Ksheerapaka, Shatavari Siddha Ksheerapaka for Garbha Poshana in 7th, 8th and 9th month of pregnancy respectively on the basis of WHO ANC Recommendations and scoring of subjective parameters in totality of institutional set-up.
- To compare and evaluate the efficacy of Garbhini Ksheerapakas and Iron, Calcium for Garbha Poshana in the

7th, 8th and 9th month of pregnancy on the basis of WHO ANC Recommendations and scoring of subjective parameters in totality of institutional set-up.

technique (Lottery Method), each consisting of 15 subjects. Written and informed consent was obtained from all participants prior to their inclusion.

MATERIALS AND METHODS

Study Design: This study was a simple randomized, open-label, controlled clinical trial conducted on 30 subjects at the OPD and IPD of the Department of Prasuti Tantra and Stree Roga, Sri Sri College of Ayurvedic Science and Research Hospital, Bengaluru. Ethical clearance was obtained from the Institutional Ethics Committee (IEC) before the commencement of the study (Protocol No: SSIEC/238/2022, dated 18/10/2022), and the trial was registered prospectively with CTRI (Registration No: CTRI/2023/07/055890). 30 Subjects who have completed 24 weeks of gestational age fulfilling inclusion criteria were assigned randomly into 2 equal groups by simple randomization

Drug Source and Preparation: Morata (*Chonemorpha macrophylla* Roxb.) and Shatavari (*Asparagus racemosus* Willd.) were procured in raw form from a GMP certified pharmacy, and FSSAI approved Yava (*Hordeum vulgare* Linn.) was obtained. The authenticity of the drugs was verified at the Departmental Drug Testing Laboratory, Department of Dravyaguna, Sri Sri College of Ayurvedic Science and Research. Kwatha Churna was prepared in coarse powder form at the Rasashastra and Bhaishajya Kalpana Pharmacy of Sri Sri College of Ayurvedic Science and Research, Bengaluru. Yava Kwatha Churna, Morata Kwatha Churna, and Shatavari Kwatha Churna were then measured, packed in airtight ziplock covers, labelled, and distributed to individual subjects.



Figure 1: Packaging of Yava, Morata and Shatavari Kwatha Churna

Sample Size: Based on population prevalence, the estimated sample size for the study was 231 using the appropriate RCT sample size formula. However, due to the short duration of the study, it was limited to 30 subjects.

A detailed case proforma was prepared to document all relevant clinical and demographic details. Necessary investigations as per ANC protocol were conducted, and the findings were systematically recorded.

Inclusion Criteria

- Pregnant women of age group 20-40 years.

- Primigravida and Multigravida
- Subjects who have just completed 24 weeks of gestational age.
- Subjects having haemoglobin value of 10 g/dL or more.
- Subjects who are willing to give written consent for the study.

Exclusion Criteria

- Subjects up to 24 weeks of gestational age.
- Systemic diseases like Hypertension, Diabetes Mellitus, Severe Anaemia, Thyroid disorders.
- High risk pregnancies like Pre-eclampsia, Gestational Diabetes, Ante-partum Haemorrhage, Polyhydramnios.

Intervention

Table 1: Intervention in Trial Group and Control Group

Group	Group A			Group B
Month	7 th Month	8 th Month	9 th Month	7 th to 9 th Month
Period of Gestation	25-28 weeks	29-32 weeks	33-36 weeks	25-36 weeks
Medicine	Yava Siddha Ksheerapaka	Morata Siddha Ksheerapaka	Shatavari Siddha Ksheerapaka	Ferrous Ascorbate 100mg 0-1-0 (After food) Calcium Carbonate 500mg 1-0-0 (After food)
Posology	Dosage- 48mL (1 Pala) morning and evening before food. Duration- 3 months (From 25 to 36 weeks of gestational age) ⁷			

Subjective Parameters

- 1) Fatigue
- 2) Pedal Oedema
- 3) Backache
- 4) Heart Burn
- 5) Malapravritti
- 6) Heaviness of body (Anga Gourava)

Objective Parameters

- 1) Haemoglobin (g/dL)
- 2) Maternal Weight Gain (kg)
- 3) Fundal Height (cm)
- 4) Abdominal Circumference (cm)
- 5) Foetal Weight (g)
- 6) USG findings: Biparietal diameter, Femur length, Abdominal Circumference, Head Circumference, Amniotic fluid Index
- 7) Mode of Delivery

Statistical Analysis: Data generated during the study period was collected and analysed statistically. The study utilized Friedman Repeated Measures Analysis of Variance on Ranks with the Student Newman-Keuls method for within-group comparisons at multiple time points and the Mann-Whitney Rank Sum test for between-group analyses. For parameters assessed at two time points, such as Haemoglobin (pre- and post-treatment) and Amniotic Fluid Index (32 and 36 weeks), the Wilcoxon Signed Rank test was used for within-group comparisons, while the Fisher Exact Test determined statistical differences between groups. Significant changes in anthropometric parameters, attributed to physiological pregnancy-related growth, were analysed by calculating the mean difference between Group A and Group B. Results were interpreted based on p-values: Non-Significant ($p > 0.05$), Significant ($p < 0.05$), and Highly Significant ($p < 0.001$). Clinical effect size was calculated to quantify the degree of clinical improvement.

OBSERVATION AND RESULTS

In this study, the majority of subjects (46.7%) were aged 25–29 years, aligning with peak reproductive health. Most participants (93.3%) were Hindu, reflecting local demographics, and 60% belonged to the lower socio-economic class, indicating the rural population's reliance on antenatal care facilities. Educationally, all participants were literate, with 15 being graduates, highlighting good health awareness. Homemakers formed 66.7% of the group, reflecting the rural setup. Most subjects (63.3%) were from rural areas, with easy access to the institution. Primigravida women (66.7%) predominated, and 2 cases of consanguineous marriages showed no adverse fetal outcomes. Sleep disturbances affected 36.7% of participants, a common issue during pregnancy. Prakruti distribution showed 50% with Vata-Pitta dominance, while Satva levels were primarily Madhyama (50%). Fetal presentation was predominantly cephalic (90%), with isolated cases of breech and transverse lie noted on USG.

Table 2: Effect of intervention on Maternal Parameters

G	BT	28 Weeks (AT1)	32 Weeks (AT2)	36 Weeks (AT3)
Fatigue				
A	2.00 (2.00-2.00)	2.00 (1.75-2.00) p<0.001 (HS)	1.00 (1.00-1.00) p<0.001 (HS)	1.00 (1.00-1.00) p<0.001 (HS)
B	1.50 (1.00-2.00)	1.50 (1.00-2.00) p=1.00 (NS)	2.00 (2.00-2.00) p=0.138 (NS)	2.00 (1.00-2.00) p=1.558 (NS)
Pedal Oedema				
A	1.00 (1.00-2.00)	1.00 (1.00-1.00) p=0.748 (NS)	0.00 (0.00-0.00) p=0.019 (S)	0.00 (0.00-0.00) p=0.041 (S)
B	1.00 (0.00-1.00)	1.00 (0.00-1.00) p=0.574 (NS)	1.00 (1.00-1.00) p=0.017 (S)	1.00 (1.00-2.00) p=0.033 (S)
Backache				
A	2.00 (2.00-2.00)	2.00 (2.00-2.00) p=1.000 (NS)	1.00 (1.00-1.00) p=0.056 (NS)	1.00 (1.00-1.00) p=0.026 (S)
B	2.00 (1.25-2.00)	2.00 (1.25-2.00) p=0.119 (NS)	2.00 (2.00-2.00) p=0.119 (NS)	2.00 (2.00-2.00) p=0.119 (NS)
Heartburn				
A	0.50 (0.00-1.00)	0.50 (0.00-1.00) p=0.649 (NS)	0.50 (0.00-1.00) p=0.649 (NS)	0.00 (0.00-0.00) p=0.649 (NS)
B	0.00 (0.00-0.75)	0.00 (0.00-0.75) p=0.639 (NS)	1.00 (1.00-1.00) p=0.639 (NS)	1.00 (0.25-1.00) p=0.639 (NS)
Disturbed Mala Pravrutti				
A	1.50 (1.00-2.00)	1.50 (1.00-2.00) p=0.416 (NS)	1.50 (1.00-2.00) p=0.416 (NS)	1.00 (1.00-1.00) p=0.416 (NS)
B	1.00 (1.00-1.00)	1.00 (1.00-1.00) p=0.136 (NS)	2.00 (1.00-2.00) p=0.136 (NS)	2.00 (1.00-2.00) p=0.136 (NS)
Anga Gourava				
A	2.00 (2.00-2.00)	2.00 (2.00-2.00) p=1.000 (NS)	1.00 (1.00-1.00) p=0.001 (S)	1.00 (1.00-1.00) p=0.003 (S)
B	2.00 (2.00-2.00)	2.00 (2.00-2.00) p=0.181 (NS)	2.00 (2.00-2.00) p=0.181 (NS)	2.00 (1.25-2.00) p=0.181 (NS)
Maternal Weight Gain				
A	69.00(57.7-73.92)	71.20(59.27-77.65) p<0.001 (HS)	73.20(62.45-79.55) p<0.001 (HS)	78.00(63.85-81.80) p<0.001 (HS)
B	61.20(58.25-68.00)	62.40(60.20-69.65) P <0.001 (HS)	66.20(61.00-72.35) p <0.001 (HS)	66.00(61.85-74.27) p <0.001 (HS)
Symphysial Fundal Height				
A	24.40(24.20-24.57)	28.50(28.20-29.80) p <0.001(HS)	33.10(32.40-33.80) p <0.001(HS)	37.60(36.90-37.80) p <0.001(HS)
B	24.00(23.60-24.35)	27.50(27.20-27.95) p <0.001(HS)	31.60(31.10-32.40) p <0.001(HS)	36.10(34.90-36.47) p <0.001 (HS)
Maternal Abdominal Circumference				
A	95.00(83.90-97.25)	97.00(89.90-99.92) p <0.001(HS)	99.40(97.125-103.42) p <0.001(HS)	102.80(98.35-108.07) p <0.001(HS)
B	91.60(89.85-94.05)	94.20(91.20-96.80) p <0.001(HS)	97.20(95.25-99.07) p <0.001(HS)	98.60(97.20-102.10) p <0.001(HS)
G	BT		AT	
Haemoglobin				
A	10.60(10.32-11.75)		11.80(11.62-11.87) p <0.001 (HS)	
B	11.80(11.50-12.20)		11.70(11.20-11.80) p <0.001 (HS)	
Data: (Median with 25th and 75th percentile, p-value with statistical inference)				
G- Group; BT- Before Treatment; AT- After treatment; NS- Non-Significant; HS- Highly Significant; S- Significant				

Table 3: Effect of intervention on Foetal parameters based on USG

G	BT	32 Weeks	36 Weeks
Expected Foetal Weight			
A	428.00 (349.25-479.00)	2037.00 (1824.50-2208.50) p <0.001 (HS)	2900.00 (2813.00-3081.25) p <0.001 (HS)
B	487.00 (454.50-525.00)	2025.00 (1951.50-2118.75) p <0.001 (HS)	2708.00 (2581.00-2830.75) p <0.001 (HS)
Femur Length			
A	3.61 (3.15-3.78)	3.61 (3.15-3.78) p <0.001 (HS)	8.56 (8.12-9.05) p <0.001 (HS)
B	3.82 (3.35-4.18)	6.20 (5.90-6.33) p <0.001 (HS)	7.10 (6.83-7.37) p <0.001 (HS)
Abdominal Circumference			
A	15.40(14.43-16.10)	28.10(26.90-29.65) p <0.001 (HS)	34.20(32.95-34.75) p <0.001 (HS)
B	15.70(15.25-16.26)	27.50(26.57-28.98) p <0.001 (HS)	32.55(31.61-32.97) p <0.001 (HS)
Head Circumference			
A	17.62(16.98-18.98)	30.20(29.65-31.32) p <0.001 (HS)	34.80(33.57-35.50) p <0.001 (HS)
B	18.58(17.73-18.91)	28.92(27.59-29.62) p <0.001 (HS)	32.31(31.95-32.90) p <0.001 (HS)
Biparietal Diameter			
A	5.04(4.30-5.32)	8.30(8.00-8.59) p <0.001 (HS)	9.80(9.29-10.06) p <0.001 (HS)
B	5.20(4.82-5.54)	7.96(7.61-8.28) p <0.001 (HS)	9.10(8.92-9.26) p <0.001 (HS)
G	BT	AT	
Amniotic Fluid Index			
A	12.50(11.05-13.42)	14.00(12.20-15.37) p =0.048 (S)	
B	13.00(12.00-14.87)	12.00(11.00-13.87) p =0.107 (NS)	
Data: (Median with 25th and 75th percentile, p-value with statistical inference)			
G- Group; BT- Before Treatment; AT- After treatment; NS- Non-Significant; HS- Highly Significant; S- Significant			

Effect of Garbhini Ksheerapakas on subjective and objective parameters

Fatigue: Among the 15 subjects in Group A, 9 reported fatigue that was not relieved by rest, limiting instrumental activities of daily living prior to treatment. The remaining 6 subjects did not experience fatigue. Following the administration of Garbhini Ksheerapaka, all 9 subjects experienced 100% relief from fatigue by 32 weeks of pregnancy, with no recurrence of fatigue for the remainder of their pregnancy. Statistical analysis of Group A gave highly significant result (P<0.001). In Group B, among the 10 subjects who reported with fatigue, only 3 found complete relief whereas in 7 subjects, fatigue persisted. There was no statistically significant relief found before and after treatment in Group B suggesting that the control group had no effect on fatigue. Between the group analysis gives p-value < 0.05 by 32 weeks and 26 weeks suggesting that Garbhini Ksheerapakas had a more significant and pronounced effect in reducing fatigue than the standard Iron and Calcium supplements provided to Group A.

Fatigue during pregnancy could be due to elevated progesterone levels, which may act as a natural sedative, leading to increased tiredness. Additionally, the growing fetus would deplete the mother's nutrients and energy, further contributing to her fatigue. This, along with the increased basal metabolic rate and oxygen consumption required to adapt to pregnancy's metabolic demands, may exacerbate fatigue. The Balya, Rasayana, and Brumhana action of the Ksheerapakas would have helped alleviate this fatigue by replenishing the mother's energy and supporting her overall vitality.

Pedal oedema: In Group A, out of 15 patients, 4 subjects exhibited Grade 1 pedal oedema, characterized by slight pitting (2 mm depth) with no visible distortion that rebounds

immediately. Additionally, 2 subjects had Grade 2 pedal oedema, showing a somewhat deeper pit (4 mm) with no readily detectable distortion that rebounds in less than 15 seconds. The remaining 9 subjects had Grade 0 pedal oedema, meaning no clinical occurrence of oedema during the intervention period. By 30 weeks of gestation, all subjects in Group A experienced relief from pedal oedema following the administration of Garbhini Ksheerapaka. Statistically significant difference is seen by 32 weeks and 36 weeks with p<0.05 suggesting that Garbhini Ksheerapakas are effective in relieving Pedal Oedema. In Group B, 10 subjects experienced pedal oedema during the study period out of which 2 subjects had Grade 2 pedal oedema and remaining presented with Grade 1 pedal oedema, which persisted until delivery. Among these, 2 subjects progressed from Grade 1 to Grade 0 around 34-36 weeks of gestation. However, statistically significant difference is seen by 32 weeks and 36 weeks with p<0.05 suggesting that Group B also found limited improvement in the symptom. A statistically significant difference with a p-value of <0.05 was found between Group A and Group B, suggesting that Garbhini Ksheerapaka had a more pronounced effect in reducing pedal oedema than the standard Iron and Calcium supplements provided to Group A.

Pedal oedema in pregnancy occurs due to increased pressure on the veins from the growing uterus, leading to impaired venous return. Additionally, hormonal changes cause fluid retention, and reduced plasma oncotic pressure further contributes to fluid accumulation in the lower extremities. This could impair mobility and cause discomfort if severe. The probable mode of action of Yava Ksheerapaka on pedal oedema involves its Mutrala action and Sara Guna. Additionally, Morata is indicated in mainly Mutragata Rogas. The diuretic effect of both Yava and Morata could help relieve pedal oedema by promoting fluid elimination.

Backache: In Group A, out of 15 subjects, 6 complained of occasional backache, particularly between 28-32 weeks of gestation. This backache completely resolved in all patients by the end of the treatment period. The remaining 9 patients did not experience any backache during the intervention. Statistically significant difference was seen by 36 weeks with $p < 0.05$ indicating the positive effect of Garbhini Ksheerapakas on Backache. In Group B, 7 subjects reported occasional backache. By 36 weeks, only 2 subjects found complete relief in backache, whereas in the remaining 5 subjects, the complaint of backache persisted throughout the third trimester. On statistical analysis, there was no significance suggesting that the standard Iron and Calcium supplements may not have much effect on Backache. Between groups statistical analysis showed a significant difference by 32 weeks and 36 weeks with a p-value less than 0.05 suggesting that Garbhini Ksheerapaka was more effective in reducing backache compared to the control group.

The growing fetus places added stress on postural muscles as the centre of gravity shifts forward and upward, causing the spine to adjust to maintain stability. This shift increases strain on the back muscles, often leading to backache, especially in the later stages of pregnancy. The Vatahara action of the intervention helps pacifies Vata Dosha, which is a key factor in pain and stiffness, alleviating the discomfort associated with backache. The Balya and Brumhana properties further support muscle and tissue strength, reducing the strain on the muscles. Additionally, the anti-inflammatory and antioxidant properties help reduce inflammation and oxidative stress, which are contributors to muscle pain and tension. Morata, with its skeletal muscle relaxant effect, further eases muscle tightness, providing relief from backache by relaxing the strained muscles.

Heart Burn: In Group A, only 2 subjects experienced heartburn, both of whom achieved 100% relief. However, there was no significant difference noted on statistical analysis likely due to the small sample size presenting with the symptom. In Group B, 3 subjects reported heartburn, which was tolerable. The complaint was resolved in only 1 subject whereas it persisted in the remaining subjects. Statistical analysis also revealed no significant difference in Group A. There was no significant difference between Group A and Group B as well. However, based on clinical observations, the improvement seen in Group A (100% relief) was better than in Group B (28.5% relief).

Increased levels of progesterone during pregnancy inhibit the smooth muscle of the pylorus and small bowel, reducing gastrointestinal motility and delaying gastric emptying, which could lead to gastroesophageal reflux and heartburn. Garbhini Ksheerapakas being primarily Vata-Pittahara could help alleviate these symptoms with its Madhura, Sheeta, and Snigdha properties, along with its anti-inflammatory, mucilaginous, and adaptogenic effects that may soothe the gastrointestinal tract and reduce heartburn.

Mala Pravritti: In Group A, 4 subjects reported disturbances in Mala Pravritti, all of whom achieved complete relief. However, there was no significant difference noted on statistical analysis likely due to the small sample size presenting with the symptom. In Group B, 6 subjects experienced similar disturbances but only 2 subjects had complete relief whereas the remaining subjects experienced reoccurrence of the symptom throughout the final trimester. Statistical analysis revealed no significant difference in Group B. There was no significant difference between Group A and Group B as well. However, based on clinical observations, the improvement seen in Group A (100% relief) was better than in Group B (33.3% relief).

Progesterone-mediated smooth muscle relaxation during pregnancy decreases motility in the large bowel, leading to increased water absorption and constipation. While this is a normal physiological response, it could cause significant discomfort for the patient. Administering Ksheerapakas could alleviate this as it acts on the GI tract by promoting gastric emptying. Additionally, Yava has the properties of Purishajana and Vitkruta, which further assist in relieving constipation and supporting gastrointestinal health during pregnancy.

Anga Gourava: In Group A, 3 subjects reported Anga Gourava (occasional heaviness), all of whom experienced complete relief by the end of the intervention. Statistical analysis of the data revealed significant difference with p-value less than 0.05 in Group A by 32 weeks and 36 weeks. In Group B, 7 subjects experienced Anga Gourava out of which 2 subjects found complete relief whereas the remaining 5 subjects persisted with occasional heaviness throughout the third trimester. Statistically, there is no significant difference observed in Group B. Statistical analysis showed a significant difference between Group A and Group B ($p < 0.05$) at 32 weeks, indicating that Garbhini Ksheerapakas provides additional benefits over the control intervention in alleviating this symptom.

Heaviness in the body during pregnancy occurs due to several factors, including fluid retention, increased weight, and hormonal changes, slowing down metabolism and circulation. The Shramahara and Kapha Nashaka properties of Yava may help alleviate this heaviness by reducing excess Kapha, promoting lightness, and restoring energy. Also, the diuretic effect of Yava aids in reducing fluid retention. The Ksheerapakas, with their muscle relaxant and antioxidant properties, further relieve physical tension and oxidative stress, enhancing overall comfort and reducing the sensation of heaviness.

Haemoglobin: Haemoglobin levels improved in 9 subjects in Group A (60%) compared to 5 subjects in Group B (33.3%). Statistical significance was noted in both Group A and Group B with p-value < 0.05 . Although the overall statistical analysis did not show a significant difference between Group A and Group B, the mean difference calculations revealed that Group A had a slightly greater mean increase in haemoglobin (0.6 g/dL) compared to Group B (0.2 g/dL). This suggests that Garbhini Ksheerapakas may influence or at least maintain the haemoglobin levels.

However, the observed marginal increase in haemoglobin levels in Group A could have been influenced by multiple factors, such as the participants' pre-existing nutritional status, dietary habits, and individual iron absorption capacities. Therefore, it is difficult to attribute the haemoglobin improvement exclusively to the administration of Garbhini Ksheerapakas, as these external factors may have played a role in the outcome.

Yava, Morata and Shatavari contribute to improving haemoglobin levels primarily through their iron, folic acid, and antioxidant properties. Yava contains around 3.7 mg of iron per 100 g, along with folic acid which could support red blood cell production and Vitamin B1, B2, B6 helps improve metabolism and utilize iron efficiently.⁸ There is limited direct data on the specific iron content in Morata but classically it is indicated in Pandu.⁹ Shatavari provides 2.17 mg of iron per 100 g and is rich in folic acid, Vitamin C, and antioxidants, enhancing iron absorption and red blood cell formation.¹⁰

Amniotic Fluid Index: A statistically significant difference was observed between Group A and Group B at 36 weeks, with a p-value < 0.05 . In Group A, 10 subjects (66.6%) showed an

improvement in Amniotic Fluid Index (AFI), compared to only 3 subjects in Group B (20%). The mean increase in AFI was marginally greater in Group A (1.17 cm) compared to Group B (0.97 cm). This suggests that Garbhini Ksheerapakas may positively affect AFI.

The content of amniotic fluid primarily includes water, electrolytes, proteins, carbohydrates, lipids, and fetal cells. Yava has around 9-12% protein content along with essential amino acids.⁸ Morata is indicated in Trushna which could indicate its fluid replenishing properties.⁹ Shatavari also contains around 2.47g of protein per 100g.¹⁰

Foetal growth parameters: As a physiological increase in anthropometric measurements is expected during pregnancy, highly significant results were observed within each group for these parameters. Statistically significant differences between Group A and Group B were found in Symphysial Fundal Height ($p < 0.001$), Expected Fetal Weight ($p < 0.05$), Femur Length ($p < 0.001$), Abdominal Circumference ($p < 0.05$), Head Circumference ($p < 0.001$), and Biparietal Diameter ($p < 0.001$). Furthermore, Group A demonstrated a greater increase in anthropometric measurements compared to Group B when the mean differences were calculated.

Table 4: Mean difference in the Anthropometric measurements

Parameter	Mean Difference in Group A	Mean difference in Group B
Maternal Weight Gain	6.01 kg	4.16 kg
Symphysial Fundal Height	13.03 cm	11.72 cm
Maternal Abdominal Circumference	12.31 cm	8.58 cm
Expected foetal Weight	25.3.2 g	2244.0g
Femur Length	50.2 mm	33.9 mm
Abdominal Circumference	185.9 mm	166.1 mm
Head Circumference	168mm	139.4 mm
Biparietal Diameter	48.9 mm	39.7 mm

Milk itself contains growth factors such as insulin-like growth factor 1 (IGF-1), which plays a significant role in cell growth, differentiation, and metabolism. The drugs used in the study are predominantly Guru in nature with the properties of Sthairyakruta, Balya, Rasayana and Brumhana. These properties, combined with the essential nutrients provided by the herbs, support tissue formation, bone development, and overall cellular function. This comprehensive support could lead to improved weight gain and better fetal parameters, potentially offering more effective results compared to standard iron and calcium supplements.

The maternal and fetal growth parameters are physiological factors that typically progress regardless of additional interventions. Furthermore, several confounding factors, such as parental physique, stature, genetics, and the diet followed by the pregnant woman, could have influenced these anthropometric outcomes. As a result, the observed differences and calculated mean values cannot be attributed solely to Garbhini Ksheerapakas, as these external factors likely played a significant role in shaping the results.

Mode of delivery: Majority of the subjects in Group A i.e., 53.3% underwent full term normal delivery and 46.67 % underwent LSCS. Whereas in Group B, 80% of the subjects went for LSCS and only 20% underwent full term normal delivery. Yava supports muscle tone and reduces uterine stress through its nutrient content, while its antioxidants help mitigate oxidative damage. Morata could enhance muscular strength with its Balya action.

Shatavari is known for its uterine relaxant and tonifying properties, strengthens pelvic muscles, balances reproductive hormones, and reduces oxidative stress through its potent antioxidant action which could contribute to a smooth and full-term delivery.

Birth Weight of baby: Significant difference with p -value < 0.05 was noted on comparing the Birth Weight of Group A and Group B indicating that the intervention has effect on birth weight.

Lactation: Post delivery, Group A showed better results in terms of lactation as 9 subjects were with adequate lactation and in Group B, only 5 subjects were with adequate lactation. The Ksheera in Garbhini Ksheerapakas may enhance lactation through Samanya Guna Vriddhi. Additionally, Morata and Shatavari likely possess Stanya Shodhaka and Stanya Janana actions. Overall, Garbhini Ksheerapakas exhibit a Galactagogue effect, improving lactation.

Overall effect of Treatment in Group A: Group A, which received multimodal clinical management with Yava Siddha Ksheerapaka in the 7th month, Morata Siddha Ksheerapaka in the 8th month, and Shatavari Siddha Ksheerapaka in the 9th month, showed substantial improvement across various clinical parameters. Notably, 100% of subjects demonstrated improvements in fatigue, backache, heartburn, disturbance in Mala Pravritti, and Anga Gourava. Furthermore, 83.3% of subjects reported relief from pedal oedema, and 66.6% saw improvements in their Amniotic Fluid Index. 60% of the subjects also showed improvement, although marginal, in the Haemoglobin levels. These results indicate a broad-spectrum efficacy of Garbhini Ksheerapakas in alleviating common maternal symptoms and optimizing pregnancy health. Additionally, Group A experienced notable positive outcomes in terms of enhanced lactation and a favourable mode of delivery. The findings suggest that Garbhini Ksheerapakas provided a well-rounded benefit to the mothers in this group, contributing to improved overall maternal well-being during the later stages of pregnancy.

Overall effect of Treatment in Group B: In Group B, which received only standard iron and calcium supplementation, the improvements were less pronounced across the same clinical parameters. While 30% of patients showed improvement in fatigue, only 28.5% reported relief from backache and Anga Gourava, and 20% in pedal oedema and amniotic fluid index. Heartburn and Haemoglobin was improved in only 33.3% of the subjects. These percentages reflect a comparatively lower level of efficacy in managing the maternal symptoms when compared to Group A. Although iron and calcium supplementation are important for maintaining maternal health, the absence of the additional benefits provided by Garbhini Ksheerapakas is evident in the lower response rates suggesting that standard supplementation alone may not fully address the comprehensive needs of pregnant women in the later stages of gestation.

Overall Result of the study: Based on the overall statistical analysis, it may be inferred that majority of subjective and objective parameters in Group A, where Garbhini Ksheerapakas was administered, were found to be statistically significant compared to Group B, which received standard iron and calcium supplements. Statistical analysis between the groups showed significant difference between Group A and Group B in 12 out of 17 parameters. Additionally, Group A demonstrated better clinical relief, as shown by effect size calculations, with a lower incidence of subjective symptoms and positive outcomes in parameters such as mode of delivery and lactation, compared to Group B. Hence, Null hypothesis (H_0) is rejected and Alternate hypothesis (H_1) is

accepted i.e., there is significant effect of Garbhini Ksheerapakas for Garbha Poshana in the 7th, 8th, and 9th month of pregnancy.

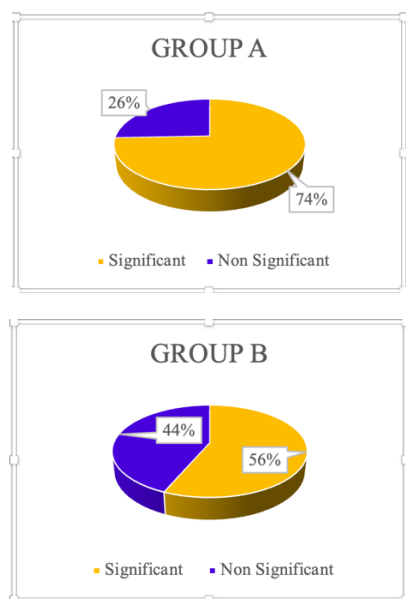


Figure 2: Overall percentage of significance in Group A and Group B

DISCUSSION

Acharya Charaka has described that during pregnancy, due to Prachalita Doshas and Dhatus, the Garbhini will be more prone to Vikruti Avastha. Hence, she should be treated with utmost care, like handling a pot filled to the brim with oil, where even the slightest disturbance can lead to significant complications for both the mother and the fetus, both during and after pregnancy.¹¹ The aim of Garbhini Paricharya is to achieve a positive pregnancy experience. As per WHO, a positive pregnancy experience is defined as maintaining physical and sociocultural normality, maintaining a healthy pregnancy for mother and baby (including preventing and treating risks, illness, and death), having an effective transition to positive labour and birth, and achieving positive motherhood (including maternal self-esteem, competence, and autonomy).¹²

Importance of Garbha Poshana in Third Trimester

The foetus does not experience hunger or thirst in the womb as it is sustained by the mother's Ahara Rasa through the Nabhi Nadi, connected to the mother's Rasavaha Nadi. This nourishment, termed Upasneha, parallels placental nutrient exchange. Acharya Charaka adds Upasveda, which works alongside Upasneha to nourish the developing foetus through osmosis and diffusion. Once organs are fully developed, the Nabhi Nadi connects the foetus's umbilicus to the Apra (placenta) and Matruhrdaya (maternal heart), transporting nutrients. While Dalhana compares this process to Kedara Kulya Nyaya, Ashtanga Sangraha suggests nutrient metabolism occurs in the foetus's Pakwasaya via Kayagni.^{13,14}

So, the fetus relies entirely on the mother for nutrition and oxygen, making maternal nourishment crucial for healthy fetal growth. Nutritional deficiencies lead to conditions like anaemia, preeclampsia, gestational diabetes, IUGR, and low birth weight, increasing neonatal morbidity and mortality. Proper nourishment through Garbhini Paricharya, incorporating Madhura, Rasayana, and Brumhana Dravyas, enhances Srotas' competence, improving nutrient bioavailability and tissue perfusion. Placental insufficiency, often caused by poor nutrition or maternal health

issues, impairs nutrient transfer, resulting in complications like IUGR, preterm birth, and fetal distress. Additionally, inadequate prenatal care exacerbates risks by missing opportunities for early intervention. In the third trimester, Garbha Poshana becomes critical to support fetal growth, prevent complications, and prepare for childbirth, ensuring both maternal and neonatal health.

Garbhini Paricharya and Epigenetics

Garbhini Paricharya could be regarded as an epigenetic intervention, influencing maternal and fetal health by modulating gene expression through diet, stress management, and lifestyle modifications. It may regulate genes linked to fetal development, immunity, and metabolism, reducing pregnancy complications, and promoting overall well-being.²²⁰ Integrating Garbhini Paricharya with modern prenatal care could enhance outcomes, though further research is needed to explore its specific epigenetic mechanisms.

Probable mode of Action of Ksheerapakas in Pregnancy

The administration of month-wise Ksheerakashaya is a traditional Ayurvedic practice widely followed in Kerala, with references found in classical texts like Sahasrayogam and Arogyakalpadruma. Ksheerapakas combine the nourishing and rejuvenating properties of milk with the therapeutic effects of medicinal herbs. Milk, with its Madhura Rasa, Snigdha Guna, Madhura Vipaka, Seeta Virya, Dhatuvarhdhana and Ojasya qualities, acts as a base that enhances the bioavailability of active phytoconstituents while mitigating the Tikshnatva and Ushnatva of the herbs used. HPTLC studies have shown that milk-based decoctions extract a higher amount of phytoconstituents than water-based ones.¹⁶ Being a rich source of calcium, milk provides essential minerals such as phosphorus (P), sodium (Na), potassium (K), chloride (Cl), and magnesium (Mg). The lactose in milk facilitates calcium absorption, while its antioxidant properties, supported by nutrients like vitamins A and E, selenium, zinc and glutathione, help reduce oxidative stress, especially during the third trimester, protecting against complications like preeclampsia and IUGR.¹⁷ The 1:15:15 proportion used in preparation ensures a milder extraction suitable for obstetric patients, offering stability and sustained drug action through slow digestion.¹⁸

Yava Ksheerapaka in 7th Month

The seventh month of pregnancy is marked by the development of Sarva Bhavas, particularly Mamsa and Shonita, as the fetus becomes Sarvanga Sampurna, with fully formed body parts (Sarvanga Avayava Pratyanga).¹⁹ This stage is crucial for preparing the fetus for birth, with rapid growth and maturation of the brain and nervous system, fat deposition for thermoregulation, and further organ development. However, complications like gestational diabetes, preeclampsia, and placental issues such as abruption or previa pose risks to maternal and fetal health.

Yava Ksheerapaka, due to its Kashaya Rasa, Ruksha Guna, Anabhishyandi and Kapha Nashaka properties, helps regulate blood sugar levels, making it effective in managing gestational diabetes. Its Sthairyakruta property provides essential nutrients and supports fetal growth and stability. The Mutrala and Lekhana effects address water retention and pedal oedema by promoting effective fluid balance, while its Vitkruta action alleviates constipation. Svarya and Varnya properties enhance fetal complexion and overall appearance.

Pharmacologically, Yava's diuretic activity²⁰ helps manage fluid retention and reduces oedema. Its laxative effect²¹ relieves pregnancy-related constipation, while its antioxidant properties²² protect against oxidative stress, safeguarding cellular health.

Hepatoprotective activity²³ supports maternal liver function, reducing risks of toxin-induced damage, supporting overall metabolic health. Yava's anti-hypercholesteraemic activity²⁴ helps lower total and LDL cholesterol levels, promoting cardiovascular health and reducing cholesterol-related risks during pregnancy.

Morata Ksheerapaka in 8th Month

The eighth month of pregnancy is characterized by the instability of Ojas (Asthiribhavati), vital for immunity. Due to the immaturity of the fetus, Ojas travels back and forth between the mother and the fetus through the Rasavaha Dhamani (Sanchari Oja). This instability may lead to fetal vulnerabilities, such as abnormal positioning or infections. If Ojas becomes too unstable and insufficiently supports the fetus, there is a risk of neonatal mortality due to the absence of Ojas and the harmful influence of Nairrta (a type of Rakshasa- correlating to infections).¹⁹ Fetal growth during this period includes significant weight gain, lung maturation with surfactant production, and pronounced fetal movements as the fetus adjusts to the limited uterine space.

Morata Ksheerapaka plays a vital role in stabilizing Ojas due to its Guru Guna, thereby supporting further fetal growth. Its Jwaraghna property combats infections that the pregnant woman might be susceptible to, while Triptighna action provides nourishment and contribute to overall well-being. Furthermore, as Stanyashodhana, Morata may enhance the quality of breast milk post-partum.

Pharmacologically, the powdered root and stems of *Chonemorpha macrophylla* exhibits laxative and anti-bilious properties²⁵, addressing common digestive issues like constipation during pregnancy. Its skeletal muscle relaxant activity²⁶ alleviates backache caused by the expanding uterus. Anti-amoebic²⁷ and anthelmintic effects²⁸ help prevent infections, while its anti-diabetic properties²⁹ manage gestational diabetes.

Shatavari Ksheerapaka in 9th Month

The ninth month marks the final stage of fetal development, with the fetus becoming Sarva Lakshana Sampurna. This stage involves hardening of bones, thickening of vernix for skin protection, shedding of lanugo, and continued brain development. These changes ensure the fetus is fully prepared for birth, with the brain remaining soft to facilitate delivery.

Shatavari, with its Madhura and Snigdha qualities, nourishes the fetus and balances Vata Dosha, preventing premature contractions and aiding smooth labour. These properties provide immunomodulatory benefits, ensuring optimal nourishment (Pushdikara) for the fetus. Its Guru Guna strengthens the foetus's bones and aids the mother in bearing down during delivery, while the Snigdha property softens the birth canal for a smoother birthing process.

Pharmacologically, Shatavari enhances milk production through its galactagogue effects³⁰, supporting lactation and mammary gland development. Shatavari also exerts anti-oxytocic activity³¹, as Shatavarin I might block oxytocin-induced uterine contractions, potentially reducing the risk of premature labour. Immunomodulatory properties³² protect against infections, while antioxidant effects³³ mitigate oxidative stress, enhancing overall maternal and fetal health. Additionally, its cardiovascular benefits³⁴, such as lowering lipid levels, promote maternal heart health, ensuring a safer and healthier delivery process.

CONCLUSION

This randomized, open-label controlled trial evaluated the efficacy of Garbhini Ksheerapakas for Garbha Poshana during the 7th, 8th, and 9th months of pregnancy. Group A, receiving Garbhini Ksheerapakas, showed significant improvements in fatigue, pedal oedema, backache, and Anga Gourava, along with better outcomes in Mala Pravritti and heartburn compared to Group B, which received standard iron and calcium supplements. Notable improvements in haemoglobin levels and Amniotic Fluid Index were also observed in Group A, though haemoglobin variations could be influenced by dietary habits and cannot be considered conclusive. While the anthropometric parameters showed significant improvement in both groups, Group A had a marginally higher mean increase. However, factors like parental physical stature and genetics make it difficult to attribute these results solely to Ksheerapakas. Group A also showed a higher rate of normal deliveries, while Group B had more caesarean sections due to prolonged labour or fetal distress. Group A demonstrated better lactation outcomes, suggesting that Ksheerapakas support postpartum breastfeeding. While Group B provided limited symptomatic relief, Garbhini Ksheerapakas offered a more comprehensive improvement across common pregnancy ailments, enhancing overall maternal well-being in the final trimester. Garbhini Ksheerapakas were well-tolerated with no significant adverse effects, making them a potential complementary therapy to standard antenatal care.

The overall assessment favors Group A, demonstrating the clinical superiority of Garbhini Ksheerapakas over standard Iron and Calcium supplementation. The study's primary objective was successfully achieved and the alternate hypothesis was accepted, confirming the beneficial role of Garbhini Ksheerapakas in promoting maternal and foetal health.

Further Scope of the Study

This study was limited to the third trimester due to time constraints, but future research could explore the long-term effects of Garbhini Ksheerapakas throughout pregnancy on maternal and fetal health. Comparative analysis of Garbhini Paricharya across different Acharyas could assess its impact on maternal well-being, fetal growth, and delivery outcomes. Further investigations could include biochemical, haematological, amniotic fluid, hormonal profile analysis, and studies on immunological changes and genetic modulation.

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