

A COMPARATIVE CLINICAL PILOT STUDY TO ASSESS THE EFFECT OF COOKED RICE IN PRESSURE COOKER AND BOILED RICE IN HEALTHY VOLUNTEERS WITH RESPECT TO BSL (BLOOD SUGAR LEVEL).

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Abstract

Background:

Cooking methods can influence the nutritional and metabolic impact of staple foods such as rice according to Ayurveda, foods retaining excess starch are considered *guru*(heavy) and may disturb metabolic balance, whereas traditionally boiled rice with starch water discarded is considered *laghu* (light).This clinical pilot study compared to the effects of pressure cooked rice and traditionally boiled rice on blood sugar levels and related metabolic symptoms in healthy volunteers.To assess and compare fasting and postprandial blood sugar levels(BSL) and selected *Aam Lakshanas* (Ayurvedic symptoms of metabolic imbalance) in individuals consuming pressure-cooked versus traditionally boiled rice.A single centre prospective comparative clinical pilot study was conducted (CTRI/2023/08/056915). Forty healthy volunteers (aged 18 to 50 years) were randomly allocated into 2 groups (n=20 each). Group A consumed traditionally boiled rice (cooked in excess water and drained), while Group B consumed pressure cooked rice for 14 consecutive days with their regular vegetarian diet. Fasting and postprandial bsl were measured on day 0, 7 and 14.Symptoms including *Balbhransha* (loss of strength), *Gaurav* (heaviness), *Aruchi* (aversion of food) and *Alasya* (laziness) were graded and statistically analysed using the Chi-square test ($p < 0.05$).

Group A demonstrated significantly lower fasting and postprandial bsl compared to Group B ($p < 0.05$). Participants consuming boiled rice also showed a marked reduction in the assessed symptoms (*Balbhransha*, *Gaurav*, *Aruchi*, *Alasya*).Traditionally boiled rice, prepared by draining starch containing water, produced more favourable metabolic responses than pressure-cooked rice among healthy individuals. This supports classical ayurvedic

claims that starch removal reduces the heaviness and glycemic impact of rice. Further large-scale studies are recommended to validate these findings.

Keywords:

Boiled rice, ressure-cooked rice, Blood sugar level ,*Aam lakshanas*, Ayurveda dietetics, Glycemic response, Pilot study.

2.Introduction:

Diet plays a fundamental role in maintaining health and preventing disease ,as emphasised in both modern nutrition science and Ayurved .According to classical Ayurveda texts improper dietary habits (*Ahara*) and frequent consumption of *guru* (heavy) foods are major contributors to metabolic disturbances and chronic lifestyle disorders such as diabetes mellitus, obesity ,and hypertension.

Rice (*Oriza sativa L.*) is a staple food for more than half of the world's population yet its metabolic effects can vary based on the method of of preparation. Modern cooking practices such as pressure cooking are widely used for convenience, but these methods retain starch and alter the glycemic properties of rice. In contrast, classical Ayurved references, including the *Dalhan Tika* on *Sushruta Samhita*, recommend boiling rice in excess water and discarding the star child liquid to achieve *laghu* (light) *madhura* (sweet) and *tarpana* (nourishing) qualities. This process is believed to reduce heaviness and support balanced digestion and metabolism.

Despite these traditional claims limited clinical data exists comparing the physiological effect of pressure-cooked and traditionally boiled rice. Understanding such differences is important, especially given the increasing prevalence of diet related non communicable diseases.

The present pilot study was therefore undertaken to evaluate and compare the effects of pressure cooked versus traditionally boiled rice on blood sugar levels and selected Am Lakshanas (symptoms of metabolic imbalance) in healthy volunteers. The study aimed to provide preliminary clinical evidence to bridge classical Ayurved knowledge with modern dietary science

3 Materials and Methods**3.1 Study Design**

This was a single-centre prospective comparative clinical pilot study conducted at A.S.S. Ayurved Mahavidyalaya Nashik, Maharashtra, India. The study was initiated after obtaining institutional ethical committee approval (Approval No.: [650/04/08/2023] and registered under the Clinical Trials Registry of India (CTRI/2023/08/056915; Registered on 25/08/2023)

3.2 Participants

Inclusion criteria: Healthy volunteers aged 18-50 years, of either gender, with a Body Mass Index (BMI) between 21 - 26 kg/m², following a vegetarian diet and providing written informed consent.

Exclusion criteria: Individuals on long -term medication, drug or alcohol dependence ,pregnant or lactating women ,participants with known diabetes mellitus ,hypertension, or other chronic illnesses and those predominantly on rice -based diet.

Sample Size and Randomisation

Forty eligible participants were randomly allocated into 2 groups (n=20 each) using a simple randomization method:

Group A: Consume traditionally boiled rice.

Group B: Consumed pressure- cooked rice.

3.3 Intervention

Participants were instructed to consume their assigned type of rice daily with lunch for 14 consecutive days as part of the regular vegetarian diet. All participants were advised to avoid non-, vegetarian food junk food, and other starchy items during study period.

Group A (Boiled Rice):

Old ,cleaned rice grains were lightly roasted on a pan ,boiled in excess water without a lid ,and the starch -containing water was drained off after cooking.

Ayurveda properties: *Madhur rasa* (sweet), *laghu* (light), *tarpana* (nourishing).

Preparation time approximately 20 minutes.

Group B (Pressure -Cooked Rice):

Cleaned rice grains and warm water were cooked together in a pressure cooker for 1- 2 whistles.

Ayurveda properties *Madhur rasa* (sweet), *Guru* (heavy)

Preparation time approximately 10 - 15 minutes.

The rice used was *Oriza sativa L.*, authenticated by the Department of Dravyaguna A.S.S. Ayurved Mahavidyalaya ,Nashik.

3.4 Assessment Parameters

Assessments were performed on Day 0 (baseline), Day 7, and Day 14.

Primary Outcome:

Change in fasting and post-prandial blood sugar levels (BSL). Fasting BSL was measured in the morning, and post-prandial BSL was recorded two hours after lunch.

Secondary Outcomes:

Changes in *Aam Lakshana* (metabolic imbalance symptoms), graded using a 4- point scale (0= none), 1= mild, 2 = moderate 3 = severe). The following symptoms were assessed:

1. *Balbhransha* - Loss of strength
2. *Gaurav*- feeling of heaviness
3. *Aruchi* -aversion to food
- 4 *Alasya* - laziness or fatigue

3.5 Statistical Analysis

All collected data were tabulated and analysed using Microsoft Excel and SPSS (Version 25.0; IBM Corp., USA). The Chi-square test was applied to compare categorical data between groups and a p, value <0.05 was considered statistically significant.

3.6 Ethical consideration

The study protocol was reviewed and approved by the Institutional Ethics Committee of A.S.S. Ayurved Mahavidyalaya, Nashik. (Approval No.: [650/04/08/2023]). Written informed consent was obtained from all participants before enrolment. The study was conducted in accordance with the ethical principle of the declaration of Helsinki (2013).

4. Results

4.1 Blood Sugar Levels (BSL)

A statistically significant difference was observed between the 2 groups in both fasting and post -prandial (BSL values throughout the study period. Group A (traditionally boiled rice) consistently demonstrated lower mean fasting and postprandial blood sugar levels compared to Group B (pressure -cooked rice).

These findings suggest that removal of starch during boiling male over the glycemc response in healthy individuals.

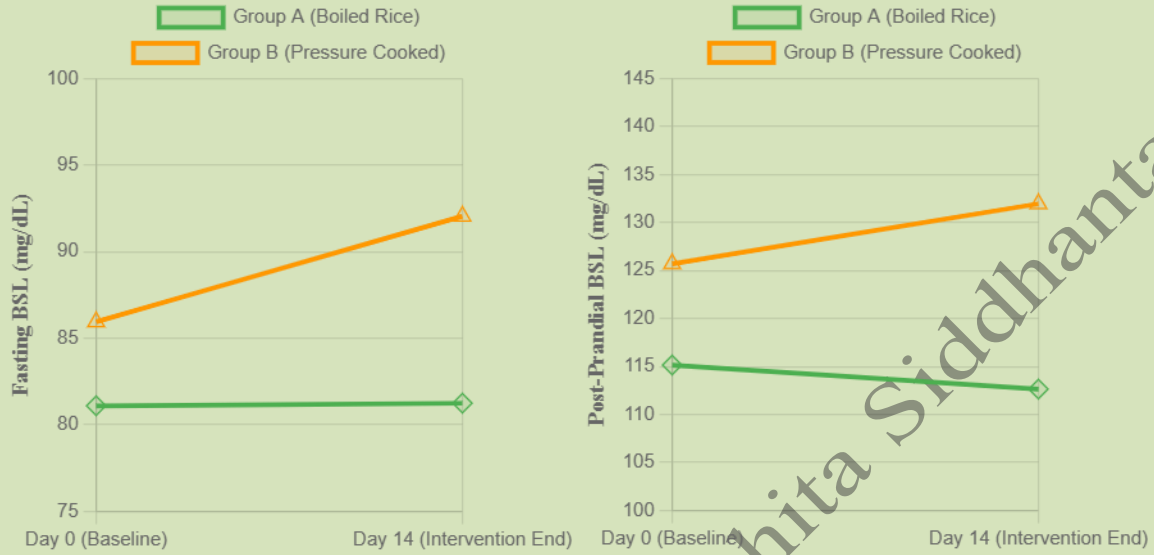


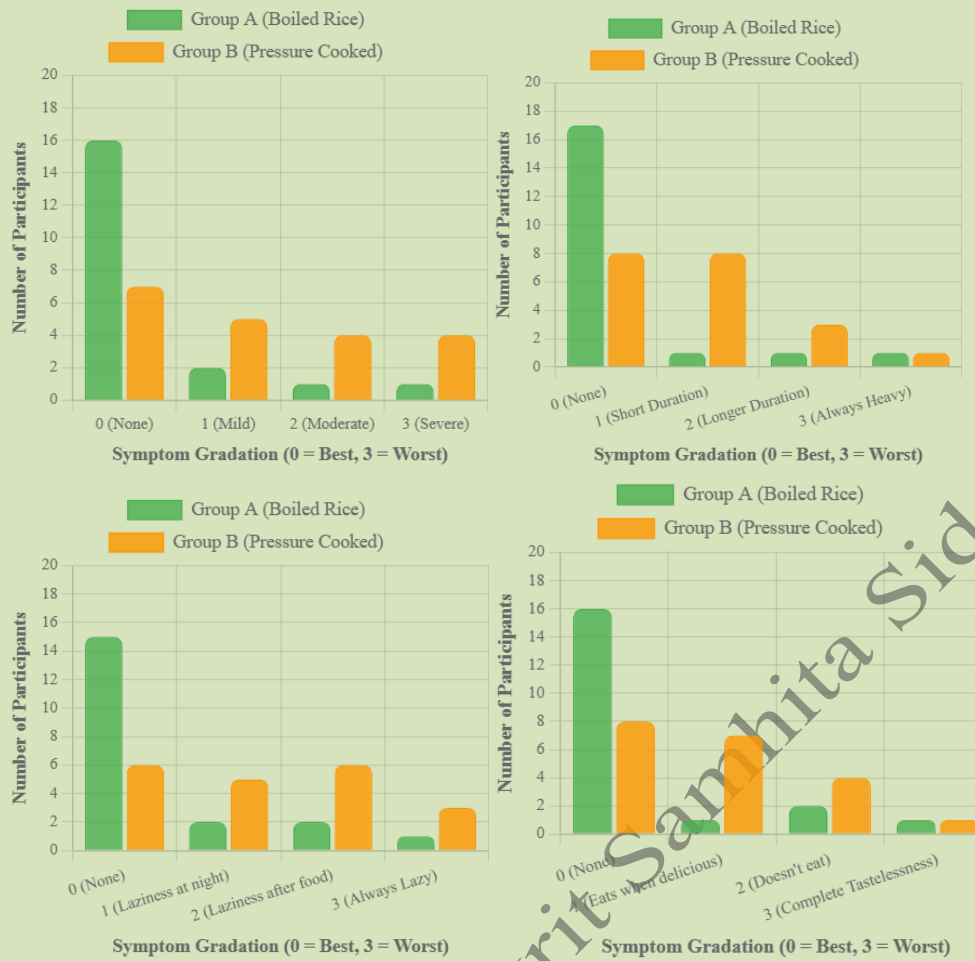
Fig:- Comparison of Fasting and Post Prandial Blood Sugar Levels 0 day- 14 day.

4.2 Symptomatic Assessment

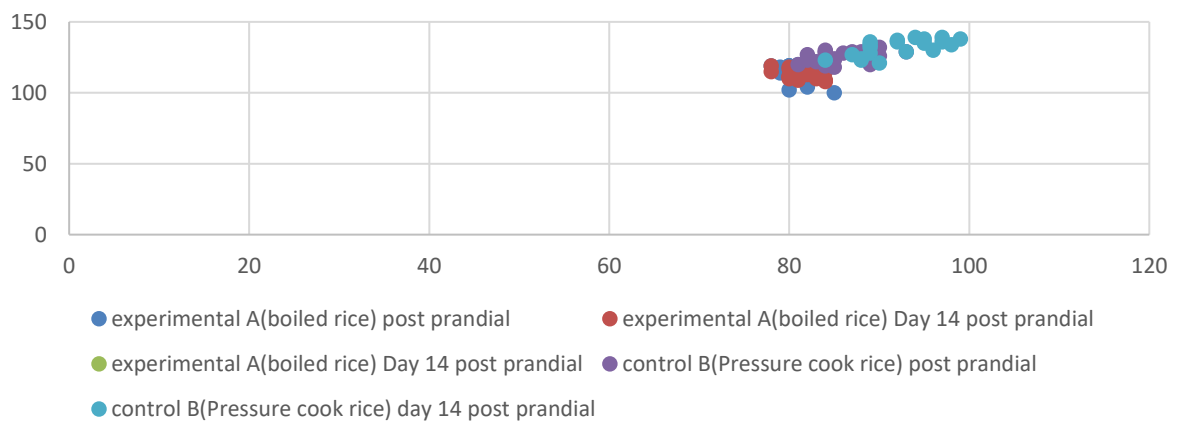
A comparative analysis using the Chi-square test was performed for the four Aam lakshanas.

Group A participants reported significant improvement in all parameters compared to Group B.

Table 2 :comparative distribution of symptoms between groups



Fasting and Post-prandial Blood Sugar Level of Experimental and Control groups



Group A boiled rice should negligible occurrence or milder symptoms across all parameters confirming the traditional Ayurved view that starts retaining foods are heavier and more likely to induce Aam lakshanas.

5. Discussion

The present study was designed to evaluate the effect of *Anna Sanskar* (processing of rice) on blood sugar levels and arm *Aam lakshanas* in healthy individuals. The comparison between traditional boiled rice (Group A). and pressure cooked rice (Group B)reveals that the method of cooking significantly influences the glycemic response and overall digestibility of the rice.

From biochemical perspective boiling rice in excess water and draining the starch removes a portion of amylopectin - the highly branched polysaccharide responsible for rapid glucose release. This process results in rise with lower glycemic index leading to a more gradual increase in post -prandial blood glucose levels . In contrast, pressure cooking retains most of the starch, which may contribute to higher glycaemic values and greater digestive load.

Ayurvedically, this findings aligned with the classical understanding that *Shuddha Anna* (light and properly processed food)promotes better *Agni*(digestive fire) and prevents the formation of *Aam* (metabolic toxins). The *Aam Lakshanas* assessed - *Balbhransha* ,*Gaurav*, *Aruchi* and *Alasya* - showed mark reduction in Group A, supporting the hypothesis that food processing affects both metabolic and subjective parameters of health. This demonstrates a tangible scientific basis for Ayurvedic dietary guidelines emphasising starch removal and lighter food preparation.

The outcomes of the study correspond with previous research indicating that rise with lower starch content leads to reduce glycaemic response and better metabolic outcomes in both diabetic and non- diabetic populations. Moreover, traditional cooking practices, often dismissed as outdated ,may possess significant preventive health benefits, particularly in the context of rising lifestyle disorders such as diabetes mellitus and metabolic syndrome.

However ,certain limitations must be acknowledged. The study sample size was modest and duration of follow up was limited to two weeks ,which may not reflect long- term metabolic effects. Additionally, only healthy participants for included; therefore extrapolation to diabetic or prediabetic population should be done cautiously. Future studies with larger sample sizes longer intervention periods and biochemical markers (e.g., insulin sensitivity lipid profile) would further validate these findings.

In summary ,the study reinforces that traditional food processing methods -especially starts removal by boiling -positively influenced blood sugar regulations and prevent *Aam* -related symptoms offering a scientific explanation for ancient Ayurvedic dietary wisdom.

6. Limitations:

This study was limited by a small sample size,,short duration (14 days) ,and the absence of HbA1C measurements which restricts assessment of long term glycaemic control. Inclusion of these measures in future studies would provide more comprehensive evidence regarding chronic effects.

In summary the study reinforces that traditional food processing methods especially starch removal by boiling positively influenced blood sugar regulation and prevent Aam related symptoms , offering a scientific explanation for ancient Ayurvedic dietary wisdom.

7. Conclusion and Recommendation

The present study concludes that the *Sanskara* (processing method) of rice significantly affects its impact on blood sugar levels and the manifestation of *Aam lakshanas* in healthy individuals.

Traditionally boiled rice, where starch is removed by excess water cooking resulted in lower fasting and postprandial blood sugar levels compared to pressure cooked rice. Participants consuming boiled rice also reported fewer *Aam* related symptoms such as *Balbhransha* ,*Gaurav* ,*Aruchi* ,*Alasya*.

These findings validate the Ayurvedic principle that proper food processing announces digestibility reduces metabolic load and promotes *Agni* (digestive fire) while preventing *Aam* formation . Thus this simple traditional method has potential implication for health promotion and disease prevention in modern dietary practices.

Recommendations

1. **For the General Population:** Adoption of traditional rice boiling method may help regulate postprandial glycaemic response and improve digestion.
2. **For Healthcare Providers:** Inclusion of culturally rooted dietary practices in lifestyle modification programs may enhance patient adherence and outcomes.
3. **For researchers:** Further large scale studies involving diabetic and pre diabetic subjects with biochemical and metabolic markers are warranted to establish broader clinical relevance
4. **For Policy and Public Health:** Integrating traditional cooking knowledge into health education and nutrition policy may contribute to diabetes prevention strategies in community setting

8. References

1. Dalhana. *Dalhan Tika on Sushruta Samhita*. Sutrasthana, Ch. 46, Shlok 344. Edited by Sharma P. Varanasi: Chaukhambha Sanskrit Pratishthan; 2008.
2. Sharangdhar. *Sharangdhar Samhita*. Madhyam Khanda, 2/169. Varanasi: Chaukhambha Sanskrit Sansthan; 2011.
3. Charaka. *Charaka Samhita*. Sutrasthana, Ch. 23, Shlok 3–7. Varanasi: Chaukhambha Orientalia; 2010.



4. Ashtanga Hridaya. *Sutrasthana*, Ch. 14, Shlok 23. Edited by Murthy KR. Varanasi: Chaukhambha Orientalia; 2012.
5. Foster-Powell K, Holt SH, Brand-Miller JC. International table of glycemic index and glycemic load values: 2002. *Am J Clin Nutr*. 2002;76:5–56.
6. Ranawana DV, Henry CJ, Lightowler HJ, Wang D, Brown RC. Glycaemic response and characteristics of rice: the effect of variety, processing and cooking method. *Br J Nutr*. 2009;102(6):874–81.
7. Juliano BO. Rice: Chemistry and Technology. 2nd ed. St. Paul: American Association of Cereal Chemists; 1985.
8. Henry CJ, Lightowler HJ, Riches C, Strik CM, Beridze T, Petropoulou S. Glycaemic index and glycaemic load of staple foods in the UK. *Eur J Clin Nutr*. 2005;59:120–5.

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