

**Research Article**

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# A Comparative KAP Study on Ragi, A Forgotten Wonder Grain with Oats among South Indian Families



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## Abstract

Ragi (Finger millet) is a traditional South Indian food, that is associated with various health benefits like reduction of cholesterol, obesity, diabetes, atherosclerosis and malnutrition. Despite its nutritional value and affordability, the usage of ragi is minimal when compared to oats, another nutritionally important cereal.

In this study, the following were assessed:

- Knowledge of South Indian women aged 25-50 years about the nutritional benefits of ragi and oats.
- Attitude - the reasons for preferring oats over ragi.
- Practice - the usage frequency of ragi and oats.

The study reveals that most of the people were ignorant about nutritional benefits of ragi in comparison to oats, an adopted food. The scores are above 6 out of 10 (mean score  $7.5 \pm 1.1$ ) for oats and less than 5 out of 10 (mean score  $3 \pm 0.8$ ) for ragi. The common reasons cited for preferring oats over ragi were less cooking time (95%), inspiration from advertisements and friends (94%) and ignorant about health benefits of ragi (91%). From this study, it was observed that 61.5% people use oats everyday whereas only 11.5% use ragi. In spite of having favourable growing conditions for cultivation and less priced than oats, there is decreased use of ragi as a staple food. Hence it is important to create awareness among the people and encourage its use.

**Keywords:** Ragi; Oats; KAP; Calcium; Anti-oxidants

## Opinion

Ragi or finger millet (*Eleusine Coracana*) is one of the common cereal grown in India and a traditional food of South Indians since 1800 BC [1]. Though Indians consume cereals as the main staple providing 70-80% of total energy intake [2], the consumption of millets is very low compared to rice. A study by CURES (Chennai Urban Rural Epidemiology Studies) revealed that millets contributed to only about 2% of total calories [3], while almost half of the daily calories were derived from refined grains [4]. Another study [5], reported that the consumption of millets (consumption unit is a coefficient and 1 CU corresponds to energy requirement of 2400kcal/day of an Indian male doing sedentary work) was 75g/CU/day in Karnataka, 16g/CU/day in Andhra Pradesh, 3g/CU/day in Tamil Nadu and almost nil in Kerala. The increase in the incidence of lifestyle disorders

like diabetes mellitus, systemic hypertension, dyslipidemia and obesity has lead to alternative adoption of foods like oats, which has high content of dietary fibres, phytochemicals, hypocholesterolaemic and anticancerous properties. However because of less favourable growing conditions in India, a higher proportion of oats consumed is chiefly imported, thereby increasing its cost.

Even though there are so many other millets like ragi which also possess similar health benefits and are comparatively cheaper, there is ignorance among people regarding their nutritional content. Hence this study was undertaken to assess the knowledge of South Indian women about the nutritional benefits of both ragi and oats, the frequency of usage and the reasons for preferring oats over ragi.

## Methodology

A cross-sectional study was conducted among 260 South Indian women with age ranging from 25 to 50 years (mean age of  $37.5 \pm 7.5$ ), who involve in purchase of grocery and cooking for their families irrespective of their socio-economic status and education. A semi-structured questionnaire was designed to test the knowledge about nutritional benefits of ragi and oats for the score of 10 each. The frequency of usage was assessed with 3 point rating scale-daily, often (at least once in a week) and occasionally (during festivals and functions). An open question was asked to know the reasons for preferring ragi over oats and the responses were recorded and organized into categories by the researcher. Informed consent was taken from all the respondents for data collection. Descriptive and inferential statistics (t-test) were calculated.

## Results

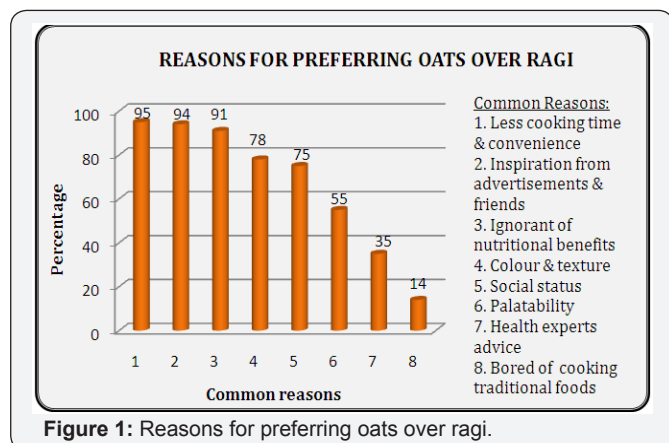
### Knowledge

Every respondents knowledge about nutritive benefits of oats and ragi was assessed out of a total score of 10. The range of score about nutritive benefits of oats was from 6 to 9 (mean score  $7.5 \pm 1.1$ ), higher than that of ragi, which was ranging from 2 to 4 (mean score  $3 \pm 0.8$ ). The difference between the scores for both oats and ragi by the same individual varied from 2 to 7 (mean score  $4.5 \pm 1.3$ ). The t-test for two scores were done assuming unequal variance with hypothesis of mean difference 4.5, which is the mean value of the difference between the scores for nutritive benefits of oats and ragi. The observed difference between the mean (7.5-3) is not convincing enough to say that the average knowledge about nutritive benefits of oats and ragi differ significantly (p value=0.9) (Table 1). However the range of score proves that the knowledge about ragi is lesser than oats.

**Table 1:** Scores of knowledge about nutritive benefits of oats and ragi.

Variable	Mean	Std Dev	T-Test
Oats	7.51	1.12	0.90*
Ragi	3.00	0.82	
Difference	4.50	1.32	

### Attitude



The study reveals that the most common reasons for preferring oats over ragi (Figure 1) were less cooking time and convenience (95%), inspiration from advertisements and friends (94%) ignorance about nutritional benefits of ragi (91%), colour and texture (78%), social status (75%), palatability (55%), health experts advice (35%) and bored of cooking traditional varieties (14%).

### Practice

From the study, it was observed that 61.5% of participants use oats on daily basis, whereas only 11.5% use ragi. Almost 32% use oats and 25% use ragi at least once in a week. The occasional use percentage of ragi: oats is 63.5: 6.5.

### Discussion

Since the seed coat of ragi is five layered, it has more dietary fibre content (11.5g) [2,6] than oats (10.6g) [7], which include polysaccharides such as  $\beta$ -glucan, arabinoxylans and cellulose. They reduce the rate of cholesterol absorption by increasing the viscosity of gut contents [8] and causes binding of bile acids to increase the excretion of cholesterol [9]. Short chain fatty acids like butyric acid, which are produced by fermentation of dietary fibres in the large intestine are involved in countering colon cancer by modulating gene expression and inducing apoptosis [10]. Dietary fibre also serve as a substrate for gut microflora and promotes laxation [11]. Even though the concentration of proteins is low in ragi than oats, the prolamine fraction is high [12]. Prolamine contains the higher proportion of glutamic acid, proline, valine, isoleucine, leucine and phenylalanine. They are gluten-free [13] and are safe to be used in persons with celiac disease. The lipid content of oats (6.9g) is higher than ragi (1.3g) which causes poor flavour and excessive browning. It also has higher amount of lipases that cause rancidity and short storage life [14].

The calcium content of ragi (344mg) is higher than oats (54mg). Micronutrients like molybdenum, chromium, sulphur and vitamins like carotene, folic acid and choline are present in ragi while they are negligible in oats. Though vitamin C is absent in both ragi and oats, ascorbic acid is formed in ragi during the process of germination and therefore the iron in ragi is easily absorbed [15]. Ragi is a very good source of phenolic compounds [16,17] like ferulic acid, caffeic acid and vanillic acid [18]. Polyphenols play a very important role in enhancing endothelial function [19], cellular signalling and anti inflammation [20], free radicals scavenging [21] and anti oxidant effect [22]. They also lower blood glucose by effective inhibition of  $\alpha$ -glucosidase, pancreatic  $\alpha$ -amylase and fructose induced albumin glycation [23]. In spite of having more nutritional value (Table 2), the usage of ragi is minimal mainly because of unawareness among the people regarding its health benefits. The convenience of easy cooking, advice from friends and health experts, colour, texture, palatability and a symbol of social status were other reasons for preferring oats. Even though 14% of people were

bored of cooking traditional varieties, still ragi gained a higher occasional use in festive seasons. The glycemic response (GR) of oats is generally lower than ragi. In most of the studies, GR was measured from venous samples but newer guidelines necessitate capillary glucose samples because of its greatest sensitivity for glycemic index (GI). Hence more studies and researches are further needed to determine the glycemic response for different preparations of ragi [24].

**Table 2:** Nutrients, vitamins and minerals composition of ragi and oats (all values are per 100g of edible portion).

Parameter	Ragi	Oatmeal
Moisture (g)	13.10	8.22
Protein (N* 6.25) (g)	7.30	16.89
Fat (g)	1.30	6.90
Dietary fibre (g)	11.50	10.60
Carbohydrates (g)	72.00	66.00
Energy (kcal)	328.00	389.00
Vitamins		
Pantothenic acid		1.35
Carotene (µg)	42.00	0.00
Thiamine (mg)	0.42	0.76
Riboflavin (mg)	0.19	0.14
Niacin (mg)	1.10	0.96
Total B6 (mg)		0.12
Folic acid (µg)		
Free	5.20	0.00
Total	18.30	
Vitamin C (mg)	0.00	0.00
Minerals and trace elements		
Calcium (mg)	344.00	54.00
Phosphorus (mg)	283.00	523.00
Iron (mg)	3.90	4.72
Magnesium (mg)	137.00	177.00
Sodium (mg)	11.00	2.00
Potassium (mg)	408.00	429.00
Copper (mg)	0.47	0.63
Manganese (mg)	5.49	4.92
Molybdenum (mg)	0.10	
Zinc (mg)	2.30	3.97
Chromium (mg)	0.03	
Sulphur (mg)	160.00	
Chlorine (mg)	44.00	

### Limitations

- The sample size small when compared to the actual population.
- The study is limited by its reliance on retrospective self-report measures.

### Conclusion

India is a country leading in both the spectrum of life-style diseases and malnutrition. The consumption of ragi is associated with reduction of total plasma cholesterol, post-prandial blood glucose, obesity, atherosclerosis, development of cancer, rickets and osteoporosis. Ragi is superior to oats in bioavailability of minerals. The climatic conditions in India does not favour cultivation of oats and hence it is chiefly imported. However ragi has favourable growing conditions, which makes it economically affordable than oats. Our study revealed that the ignorance about nutritional benefits of ragi has led to its decreased usage. Hence it is important to create awareness among the people regarding its health benefits and encourage the use of ragi.

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