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Effect of cenchrus-catharticus (Bhurat) diet on blood parameters in normal human subject

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Abstract

Malnutrition is a problem of great concern to developing countries like India. The nutritional scientists and food technologists are facing a new challenge to explore other sources of proteins which can overcome the barrier of good quality nutrients. The present study was conducted on 20 normal healthy vegetarian subjects by feeding them diet containing cenchrus-catharticus (bhurat) a grass seed protein for 15 days. Their blood samples were analysed for blood parameters such as total protein, serum albumin and globulin before and after intake of cenchrus-catharticus (bhurat) flour diet. It was found that total serum proteins, albumin and globulin were increased after intake of cenchrus-catharticus (bhurat) diet. It might be due to presence of essential amino acids such as lysine along with total protein contents. It can be said that cenchrus-catharticus (bhurat) seeds have good quality of protein and have great nutritional potential.

Keywords: Protein, lysine, cenchrus-catharticus

Introduction

The cenchrus-catharticus plant possesses vertical cylindrical hollow stem standing upon its roots and strengthened at intervals by transverse septa known as nodes. In the desert, the cultivation is limited and the natural vegetation is scarce. The grasses offer nutrition to the livestock.

This desert suffers from frequent occurrence of famine, but the speciality of cenchrus-catharticus (Bhurat) plant lies in the fact that rain of about 5 cm is sufficient for its general growth and full development (Vyas *et al.*, 1975)^[1,3].

On ripening, the nutritive value of the grass enhances due to the presence of the seed. Such grass has influence on the milk production in animals. The seeds are often consumed by the human inhabitants of the desert area in bread making. The grass is palatable and is grazed as green or is harvested for feeding as a sole feed or mixed with Pala. This is one of the most common and a very uncomfortable grass to both man and animal. Since the prickly husk sticks to the cloth of the farmer and the hair of the latter and is very much difficult to remove.

It is regarded as the most nutritive of the famine foods. Even in ordinary times, its fried "Atta" mixed with ghee and sugar is given to children for the improvement of their health.

Amongst the other nutritional sources, one of the least expensive is cenchrus-catharticus - a grass seed, which is abundantly available in Rajasthan - a desert part of India having great nutritional potential and these seeds are largely utilized by the villagers during the period of famine, in this part of country which is generally lacking in rain.

Review of Literature

Cenchrus-Catharticus (Bhurat)

Bor (1960)^[3, 4, 8, 11] reported that cenchrus-catharticus is found in bushes in desert and stony places, and adheres on the root hair giving them fatty appearance, spikelets symmetrical and turgid at maturity.

Bailey (1963)^[2] reported that the cenchrus-catharticus is annual grass with simple racemes of burs that become detached and adhere readily to clothing and animal fur. It causes severe ulceration in the feet of animals. The barbs of the grass cannot be removed by simple shaking. Duthie (1988)^[4] relates the following anecdote about the fruits of Bhurat "The Bagris tell that an emperor of Delhi was on his way with army to attack Bikaner. When Bhurat stuck on his

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arm, he picked it off and it stuck on his finger, he tried to bite it off and it stuck on his lip and gave him a great pain. When he was told, the country was full of these things, he did not venture further and Bikaner was saved from invasion".

Stearn *et al.* (1960)^[11] observed that the cenchrus-catharticus is an extremely valuable fodder grass as it remains green during the dry season and cattle eat it with avidity.

Peters (1960)^[8] reported that the young grass can be stored and seeds are eaten in times of famine in Africa.

Bhurat, which is one of the most abundant and a common grass throughout the desert area, on sand and is very much used in the time of scarcity. The grain is grounded and mixed with Bajara Atta and consumed as human food. In some interior places, Bhurat is consumed as a natural food just after rain. Bhurat bread is said to be a very healthy food.

Protein

The liver is the sole source of albumin, prothrombin and fibrinogen. Most of alpha and beta globulins are also of hepatic origin, but the gamma globulin originates from the plasma cells and lymphoid tissues (Harper *et al.*, 1979)^[6]. The nutritive value of most plant proteins is limited by a deficiency of one or more amino acids and an appropriate mixture of plant proteins can achieve a favourable amino acid balanced. All of the amino acids essential in the diet have been identified (Rose & Womac, 1946)^[10].

Hariharan *et al.* (1967)^[5] have reported that poor Indian diets based on different cereals and millets are deficient in certain dietary essentials such as proteins, minerals and vitamins and hence they do not promote optimal growth of rats.

Panemangalore *et al.* (1967)^[7] reported that the protein malnutrition is widely prevalent among weaned infants and pre-school children. Attempts have been made by scientists and international agencies to develop low cost protein foods

based on locally available protein rich raw materials such as oil seed meals and legumes for use as supplements to the diets of children. They have reported the nutritive value of proteins and supplementary value to poor diets of the protein foods based on blends of ground nut, Bengal gram, Soyabean and sesame flour.

Wannemacher *et al.* (1963)^[14] showed that there is a decreased synthesis of serum albumin and globulins in protein deficient dogs. The plasma proteins have frequently been used for the study of turn over kinetics in animal body (Anker, 1960)^[11].

Material and Methods

The present study was conducted on 20 purely vegetarian male subjects aged between 30 to 55 years. They were selected irrespective of caste and creed. Detailed history was taken to explore any major illness likely to effect blood protein level. The subject having history of drug intake, radiation and infection during the study was excluded from the present study. The follow up study was conducted before and after intake of cenchrus-catharticus (Bhurat) flour diet for two weeks each person acted his own control. They were allowed to take their routine dietary articles except wheat chapaties were replaced by cenchrus-catharticus (Bhurat) flour chapaties. Thus, any changes occur in blood protein reflect the effect of cenchrus-catharticus flour. The subject presented themselves for the present study on the basis of personal relatives, friends and personal relation. The fasting blood samples were taken before and after 15 days intake of cenchrus-catharticus flour diet. The total serum proteins, albumin and globulin levels were measured by semi autoanalyser using analytical kits. The results are tabulated in table no. I.

Table 1: The mean values of blood parameters before and after 15 days intake of cenchrus-catharticus (Bhurat) flour diet

Parameters Gm %	Before intake of cenchrus-catharticus flour diet Mean + SD	After intake of cenchrus-catharticus flour diet Mean + SD	p-values
Total serum protein	6.81±0.35 (5.82 to 7.54)*	7.44±0.52 (6.61 to 8.30)*	< 0.001
Serum Albumin	3.72±0.21 (3.52 to 4.17)*	4.23±0.25 (3.86 to 5.00)*	< 0.001
Serum globulin	2.78±0.18 (2.30 to 3.37)*	3.06±0.21 (2.73 to 3.30)*	< 0.005
A : G ration	1.35±0.06 (1.29 to 1.38)*	1.38±0.05 (1.30 to 1.41)*	< 0.5 Not significant

Figures in parenthesis indicate the range.

Result and Discussion

It is observed from Table - I that the total serum proteins was found to be 6.8±0.35 with a range of 5.82 to 7.54 gm per cent in the normal subjects before taking cenchrus-catharticus flour diet. These values are in collaboration with the findings of Vasudeven *et al.* (2011). These values were found to be increased to 7.694 ± 0.52 with a range of 6.61 to 8.31 gm per cent after 15 days intake of cenchrus-catharticus diet. The increase was statistically significant as evident by p-value ($p > 0.001$). The increase in total serum proteins after intake of cenchrus-catharticus diet might be due to increased amount of protein in cenchrus-catharticus seeds as compared to that of wheat proteins.

The mean serum albumin level was found to be 3.72±0.21 with a range of 3.52 to 4.17 gm percent in human subjects before intake of cenchrus-catharticus diet: These values are resembled with findings of Vasudeven *et al.* (2011). These values were found to raised to 4.23 ± 0.24 with a range of 3.88 to 5.0 gm per cent after 15 days intake of cenchrus-catharticus diet. The increase was statistically significant as evident by p value ($p < 0.001$). The increase in serum

albumin in normal subject after intake of cenchrus-catharticus diet might be due to the fact that cenchrus-catharticus flour contains essential amino acids such as Lysine and Methionine which in turn increased the net utilization of proteins as compared to wheat diet which is deficient in Lysine (Vyas *et al.* 1975)^[13].

It is observed from table I that mean serum globulin level was found to be 2.78 ± 0.18 with a range of 2.30 to 3.37 gm per cent in normal subject, before intake of cenchrus-catharticus diet. These values were in close agreemul with the findings of Ray (1970)^[9]. These values were found to be increased to 3.06 ± 0.21 with a ranged of 2.73 to 3.30. gm per cent after 15 days intake of cenchrus-catharticus diet. The increased was statistically significant at 5 % level as evident by p-value which is less than 0.05. The increase in serum globulin level in normal subjects after intake of cenchrus-catharticus diet might be due to the fact that high contents of protein in cenchrus-catharticus might increased the protein efficiency ratio (PER) which in turn increased the anabolic process which resulted in increased level of serum globulin. Although increase in serum globulin level ($p < 0.005$) was less than that

of serum albumin level (0.001) after intake of cenchrus-catharticus diet as compared to that of before intake of cenchrus-catharticus diet might be due to the fact that a part of globulin (γ -globulin) utilized in the formation of antibodies and further γ -globulin diet not originate from liver resulted less increased level observe as compared to that of serum albumin level in the same group.

The serum A:G ratio was found to be 1.35 ± 0.06 with a range of 1.29 to 1.38 in normal subjects before intake of cenchrus-catharticus diet. The A:G ratio was slightly changes to 1.38 ± 0.05 with a range of 1.30 to 1.41 after intake of cenchrus-catharticus flour diet. The change was insignificant as evident by p value which is less than 0.05 ($p < 0.05$). The insignificant change in A:G ratio after intake of cenchrus-catharticus diet might be due to relative increase albumin and globulin after intake of cenchrus-catharticus diet which resulted in negligible change in A:G ratio.

Summary and Conclusions

Protein malnutrition is a problem of great concerned to developing countries like India. The nutritional scientists and food technologists are facing a new challenge to explore other sources of proteins which can overcome the barrier of good quality nutrients.

Amongst other sources of protein, one of the least expensive in cenchrus-catharticus a grass seed protein has a great nutritional potential abundantly available in Rajasthan - a desert part of India.

1. The present study was conducted in 20 normal purely vegetarian male subjects.
2. They were allowed to take the their routine dietary articles except wheat chappaties were replaced by cenchrus-catharticus (Bhurat) flour chappaties.
3. Fasting blood samples were taken before starting the experiment that is with out taking cenchrus-catharticus flour diet. There after second time blood sample were taken after 15 days of taking the cenchrus-catharticus flour diet.
4. Blood samples were analyzed for total serum protein, serum albumin and globulin by semi autoanalyzer using analytical kits.
5. Total serum protein was found to be increase after intake of Bhurat diet might be due to presence of increased amount of protein in Bhurat as compared to that of in wheat.
6. Serum albumin was also found to be increase by cenchrus-catharticus protein might be due present of essential amino acid lysine which is lacking in wheat protein.
7. Increase level of serum globulin was observed in the normal subjects after 15 days of intake of cenchrus-catharticus flour diet, might be due to increased in protein efficiency ratio (PER) by Bhurat flour diet.
8. No significant changes occurred in A:G ratio might be due to proportional increased in both serum albumin and globulin.
9. Thus, cenchrus-catharticus seeds have good source of proteins and have great nutritional potential.

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