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Research Article

IMPROVEMENT THE BOILED PIGEON PEA SEEDS BY ADDING DIFFERENT CONCENTRATIONS OF YOGHURT AS IMPROVER

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ABSTRACT

The objectives of study were to improvement the quality of pigeon pea seeds by adding improver (yoghurt 40, 80 and 100 g) to 150g boiled pigeon (removed from tannin) for preparation three diets (A, B and C). The study was conducted in the laboratory of Biochemistry, Department of Biochemistry and Molecular Biology, Faculty of Science and Technology, University of Al-Neelain in 2015. The chemical analysis, ash composition, sensory evaluation, tannin content and in-vitro-protein digestibility were investigate to three prepared diets (A, B and C). Chemical analysis as follows: 69.39-71.49% moisture, 0.7-1.2% ash, 25.5-30.6% total solid, 2.2-9.8% crude fiber, 0.15-0.30% fat, 19.57-28.87 % protein, and 0.15-9.92 % for three prepared diets. Ash composition as follows: 94.6 -100 Na ppm, 29.1-36.0 Mg ppm, 0.44-0.80 Fe ppm and 0.44-0.65 Mn ppm for three prepared diets. Sensory evaluation as follows: 2.83 -7.07% taste, 2.15-6.62% palatability, 5.35-7.46% colour and 3.83-7.48% texture for three prepared diets. Tannin content for three prepared diets ranged from 0.09-0.27% while in-vitro protein digestibility for three prepared diets ranged from 39.16-49.02 %. Findings concluded that there was significant difference ($P \leq 0.05$) in moisture, Ash, total solid, protein, carbohydrate, tannin content, sodium, magnesium iron, sensory evaluation compared with control and no significant difference ($P \geq 0.05$) in crude fiber, fat content, in vitro-protein digestibility and manganese compared with control and also showed significant difference ($P \leq 0.05$) in sensory evaluation for three processing samples compared with control. Therefore, addition of yoghurt leads to improve the quality of boiled pigeon pea seeds.

INTRODUCTION

Legumes are important and available source of proteins along with energy values and mineral content, it's considered as important food for humans, in vegetarian diets and especially for people in developing countries. Wide varieties of legumes are grown and consumed in different tropical regions in the world. The high protein content, with energy values and mineral content of legumes have been recognized for their nutritional importance. The consumption of the legumes and its nutritional availability is limited by the high content of the anti-nutritional factors, (component that interfere with digestion, absorption or other aspect in metabolism such as phytic acid and tannic acid), and to increase the nutritional value, then we can use the food processing techniques, to reduce the anti-nutritional factors and increase the bioavailability of the nutrient. Deferent food processing techniques are used to improve the nutritional value of the legumes either by increasing the availability of the nutrient or reducing the anti-nutritional factors, some of these techniques are used traditionally such as boiling, soaking, sprouting, etc. these processes may increase the protein digestibility, moisture content, it may reduce the anti-nutritional factor concentrations. Heat treatment is a usual process before legumes are used in the human diet. For example (moisture heat) such as boiling is widely accepted as an effective way to inactivating the thermo-labile anti-nutritional factors of legume. Soaking could be one of the processes to remove soluble anti-nutritional factors, which can be eliminated with the discarded soaking solution *Cajanus cajan* (L) Millsp. is a perennial member of the family fabaceae. Other common names are red gram, congo pea, gungo pea, and no-eye pea (Nan Wu *et al*., 2009). Pigeon pea (*Cajanus cajan*) seeds contains moisture (10.1%), protein (18.8%), fat (1.9%), carbohydrates (53.0%), fiber (6.6%), and

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ash (3.8%) (Saxena *et al*., 2008). It is significantly higher in sulphur-containing amino acids such as cysteine and methionine (Saxena and Stotxky, 2002). Yoghurt is a fermented milk product and consumed by large segments of our population either as a part of diet or as a refreshing beverage. It is a nutritiously balanced food containing almost all the nutrients present in milk, but in a more assimilable form. It is obtained by lactic acid fermentation of milk through the action of a starter culture containing *Streptococcus thermophilus* and *Lactobacillus bulgaricus* (Joseph and Joy, 2011).

Objective of this study were

1. Remove anti nutrition compound by boiling and dehulled the seeds of pigeon pea.
2. Prepare three diets of pigeon pea by adding yoghurt (40, 80 and 100g) to 150g of processing sample (dehulled and boiled seeds of pigeon pea).
3. Study the chemical analysis of processing sample (Organoleptic, proximate, ash and composition).
4. Measurement of minerals as sodium, iron, magnesium and manganese.
5. Measurement of protein digestibility for samples by using in-vitro-protein digestibility.

MATERIALS AND METHODS

Materials

The whole pigeon pea (*Cajanus cajan*) were obtained from the local market. The obtained material was cleaned to remove dirt, stones and foreign particles (AOAC 1990), and then washed and leave it to dried. After boiling of seeds and remove of peel, then divided into four batches (A,B,C and D) each batch contain 150 gram of pigeon pea seeds. CAPO yoghurt was used as improver (40, 80 and 100 gram), which was added to samples A, B and C respectively. Sample D was used as control (without yoghurt).

Chemical analysis

moisture, Ash, crude fiber, fat total solid, protein and carbohydrate were determined according to method described by (AOAC 1990). Estimation of minerals was done by using device called Inductivity Coupled Plasma ICP-OES 725 ES. Tannin content was determined according to the vanillin HCl method (Price *et al*., 1978) and *In vitro* protein digestibility of the samples was measured according to the method of (Manjula and John 1991).

Sensory Evaluation

A panel of hundred consumers was conscripted from students of University. Standards for selection of that panelists were regular consumers of cookies and were not allergic to any food. Panelists were decreed to evaluate color, taste, texture and palatability. Samples from four diets were coded and presented in a random sequence to the students (Obi *et al*, 2010).

Statistical analysis

Data were analyzed using one-way analysis of variance (ANOVA). Mean separation was done by the Duncan's multiple range test using the Statistical Package for the Social Sciences (SPSS) version 16.0.

RESULTS AND DISCUSSION

Table (1) indicated that moisture content for treated samples A, B, C was 71.4933, 69.3933 and 74.4500 % respectively while moisture content for non treated sample (control D) was 72.3. Ash content for treated samples A, B, C was 0.70, 0.92 and 1.2% respectively while Ash content for non treated sample (control D) was 0.55%. Total solid content for treated samples A, B, C was 28.50, 30.60 and 25.55 % respectively while total solid content for non treated sample (control D) was 27.7. protein content for treated samples A, B, C was 22.4, 19.6 and 23.9 % respectively while protein content for non treated sample (control D) was 22.2 %. Fat content for treated samples A, B, C was 0.15, 0.20 and 0.30% respectively while fat content for non treated sample (control D) was 0.05%. Crude fiber content for treated samples A, B, C was 2.20, 5.13 and 9.80 % respectively while crude fiber content for non treated sample (control D) was 5.20%. carbohydrate (CHO) content for treated samples A, B, C was 5.23, 9.92 and 0.15 % respectively while carbohydrate (CHO) content for non treated sample (control D) was 4.8 %. These findings were indicated that there was significant difference in moisture, Ash, total solid, protein, crude fiber and carbohydrate between treated samples compared with control at ($P \leq 0.05$).

Table (2) illustrated that sodium (Na) content for treated samples A, B, C was 94.69, 100 and 94.60 ppm respectively while sodium (Na) content for non treated sample (control D) was 66.75 ppm. magnesium (Mg) content for treated samples A, B, C was 36.01, 32.86 and 29.12 ppm respectively while magnesium (Mg) content for non treated sample (control D) was 28.65 ppm. Iron (Fe) content for treated samples A, B, C was 0.52, 0.80 and 0.44 ppm respectively while iron (Fe) content for non treated sample (control D) was 0.48 ppm. manganese (Mn) content for treated samples A, B, C was 0.62, 0.65 and 0.44 ppm respectively while manganese (Mn) content for non treated sample (control D) was 0.66 ppm. These results were indicated that there was significant difference in the Na, Mg, Fe and Mn between treated samples compared with control at ($P \leq 0.05$).

Table (3) indicated that taste for treated samples A, B, C was 6.11, 7.07 and 2.83 % respectively while sensory of taste qualities for non treated sample (control D) was 4.32. The results were shown B (7.07%) and A (6.11) are more taste than control (4.32), while C (2.83 %) is less taste than control (4.32). palatability for treated samples A, B, C was 5.64, 6.62 and 2.15 % respectively while palatability for non treated sample (control D) was 3.81. The results were shown B (6.62 %) and A (5.64) are more palatable than control (3.81), while C (2.15%) is less palatable than control (3.81). Color for treated samples A, B, C was 5.35, 6.27 and 7.46 % respectively while color for non treated sample (control D) was 4.25%. These findings were indicated that color of three treated pigeon pea were better than in control pigeon pea. Texture for treated samples A, B, C was 6.57, 7.48 and 3.83 % respectively while texture for non treated sample (control D) was 5.87%. The results were shown B (7.48%) and A (6.57%) are more texture than control (5.87%), while C (3.83%) is less texture than control (5.87%).

Table (4) indicated that tannin content for treated samples A, B, C and D was 0.27, 0.16 0.09 and 0.44% respectively. The

results were shown C (0.09%), B (0.16%) and A (0.27%) are less in tannin compared with control (0.44%). The results reflects that boiling technique reduced tannin content, in addition added of yoghurt as improver was declined tannin content in three treated samples. An in-vitro protein digestibility for treated samples A, B, C and D was 43.24, 49.02, 39.15% and 42.28 respectively. The results were shown B (49.02%) is increase in IVPD% compared with other treated samples and non treated sample.

CONCLUSION

According to the results obtained from study, the addition of yoghurt to three treated samples improved the Organoleptic and nutritional values.

Table 1 Show chemical analysis of A, BM C and D treated with yoghurt and non treated pigeon pea.

	A(40g yoghurt)	B(80g yoghurt)	C(100g yoghurt)	D(0g yoghurt)
Moisture %	71.49^{ab}	69.39^{a}	74.45^{abc}	72.3^{abc}
Ash%	0.70^{ab}	0.93^{abc}	1.2^{abc}	0.55^{a}
Total solid%	28.5^{abc}	30.6^{abc}	25.5^{a}	27.67^{ab}
Crude fiber%	2.20^{a}	5.13^{ab}	9.80^{abc}	5.20^{abc}
Fat%	0.15^{ab}	0.20^{abc}	0.30^{abc}	0.05^{a}
Protein%	22.40^{abc}	19.57^{a}	23.87^{abc}	22.23^{ab}
CHO%	5.23^{abc}	9.92^{abc}	0.15^{a}	4.80^{ab}

- Mean with same letters within column has significant difference while mean with
- differ letters within column has no significance differences.

Table 2 Show the minerals of A, B, C and D treated with yoghurt and non treated pigeon pea.

	A(40g yoghurt)	B(80g yoghurt)	C (100g yoghurt)	D(0g yoghurt)
Na ppm	94.7^{abc}	100^{abc}	94.6^{ab}	66.7^{a}
Mg ppm	36.0^{abc}	32.8^{abc}	29.1^{ab}	28.6^{a}
Fe ppm	0.52^{abc}	0.80^{abc}	0.44^{a}	0.47^{ab}
Mn ppm	0.62^{ab}	0.65^{abc}	0.44^{a}	0.66^{abc}

- Mean with same letters within column has significant difference while mean with differ letters within column has no significance differences.

Table 3 show the Sensory qualities for three treated samples (A,B,C) compare with control (D).

	Taste (%)	Palatability (%)	Color (%)	Texture (%)
A (40g yoghurt)	61.1^{abc}	56.4^{abc}	53.5^{ab}	65.7^{abc}
B (80g yoghurt)	70.7^{abc}	66.2^{abc}	62.7^{abc}	74.8^{abc}
C (100g yoghurt)	28.3^{a}	21.5^{a}	74.6^{abc}	38.3^{a}
D (0g yoghurt)	43.2^{ab}	38.1^{ab}	42.5^{a}	58.7^{ab}

- Mean with same letters within column has significant difference while mean with differ letters within column has no significance differences.

Table 4 Show the tannin and in-vitro protein digestibility for three treated samples (A,B,C) compare with control (D). (By percentage %).

	A(40g yoghurt)	B(80g yoghurt)	C (100g yoghurt)	D(0g yoghurt)
Tannin (%)	0.27^{abc}	0.16^{ab}	0.09^{a}	0.44^{abc}
IVPD (%)	43.24^{abc}	49.02^{abc}	39.16^{a}	42.28^{ab}

- Mean with same letters within column has significant difference while mean with differ letters within column has no significance differences.

IVPD = In-vitro protein digestibility.

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