PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Pakistan Journal of Nutrition 8 (4): 491-494, 2009
ISSN 1680-5194

Use of Soy Bean Products as Cheap Sources of Protein in Child-Nutrition in Akpuoga Nike Community, in Enugu State South East, Nigeria

Uchenna V. Okolie* and Ijeoma O. Ehiemere
Department of Nursing Sciences, Faculty of Health Sciences and Technology,
University of Nigeria, Enugu Campus, Nigeria

Abstract: Protein-energy malnutrition among children is a global problem. It is more devastating in developing countries because of high poverty level among rural dwellers. Akpuoga Nike is a typical rural community where social amenities are lacking, commercial and income generation activities are very low. Majority of the people engage in subsistence farming and petty trading. Consequently they cannot afford animal protein due to its high cost. The aims of the study were to find out the use of soy bean products as source of protein for children under-five by mothers in Akpuoga Nike and also to determine their positive and negative attitudes towards the use in the nutrition of their children nutrition. Descriptive survey research design was used to carry out the study on 100 women of childbearing age attending Akpuoga Nike Health Centre. Researchers' developed interview guide and focus group discussion were instruments used for data collection. Sixty percent of the respondents fed their children with soy bean products while 40% had never used any. In their mean rating, the respondents agreed that soy bean products have positive features such as being cheap, nutritive and a good alternative source of animal protein. While the negative features identified were; not easy to prepare, foul odor/taste and abdominal upset and flatulence. Soy products provide excellent sources of disease busting antioxidants, B. vitamins (including folate) and iron. They remain good alternative sources of animal protein in child nutrition especially in poverty stricken rural communities and mothers should be counseled on their use in the nutrition of their children.

Key words: Soy bean products, protein source, child nutrition

INTRODUCTION

Protein-energy malnutrition is one of the greatest problems facing the world today. World Health Organization (2003) estimates that about 150 million children under five years of age in developing countries are malnourished and an additional 200 million have stunted growth. In, 2000, WHO estimated that malnourished children numbered 18 million (32%) in developing countries, while estimated 149.6 million children under 5 are malnourished when measured in terms of weight for age. This figure is five times the prevalence in the Western world (WHO, 2003). Following the reports published by FAO (2001), at least 500 million children living in the world's sixty poorest nations suffer from chronic malnutrition which permanently retards their growth.

Economically, the Nigerian child has been the victim of low purchasing power of the parents. The gross domestic product (GDP) has declined over the years and this has a lot of implications to child care and nutrition as most families cannot provide nutritious foods for their members. The Federal Ministry of Agriculture in Nigeria in the year, 2000, observed that in the national food balance sheet, the protein constituent of the diet of the average Nigerian was quite inadequate. It becomes imperative therefore, that our diets especially those of our children should be enriched with affordable essential food nutrients which is available in soy bean products.

Soy bean has been severally called the "wonder bean", the "meat of the soil" and the richest source of protein ever known to man. It is also described as the only vegetable which gives complete protein, which is identical to all forms of animal protein and can be prepared in a variety of ways-soy milk, powder, cakes, among others. It contains the eight essential amino acids and is a rich source of polyunsaturated fatty acids (including the good fat-omega 3) and is free of cholesterol (FAO, 2001).

Soy products provide an excellent source of disease busting antioxidants, B. vitamins (including folate) and iron (Zhan and Ho, 2005). McVeigh *et al.* (2006) have proven that soy protein can promote heart health.

A number of studies confirm that infants fed soy-based formulas show normal growth and development (Seppo *et al.*, 2005). Soy based nutrition during infancy has a long history of safe use around the world dating back centuries. The first report of soy based infant formula in the West was in 1990 (Ruhrah, 1990) and soy based formulas were used in cases of infantile eczema as early as in the, 1920s (Hill and Stuart in Butter, 1929). Some evidence has also shown that soy bean intake during adolescence may reduce the risk of breast cancer later in life, (WU *et al.*, 2002: Trock *et al.*, 2006).

Researchers however show that the consumption of soy bean in Nigeria has been low and that cases of malnutrition are still high especially in the rural areas as eggs, meat, milk, fish etc. have become unaffordable by more than 80% of the population (FMA, 2005). There is then need for cheaper protein food options to augment and enrich the starch-based diet of most rural Nigerian families. This then necessitated this study, to find out whether the women in Akpuoga Nike, use this soy bean as well as their positive and negative attitudes towards its use in child nutrition.

Akpuoga Nike is a rural community located in Enugu East Local Government, within Ujodo Development Council of Enugu State. It has an estimated population of three thousand (3000) people with 900 of the population being women of reproductive age. As a typical rural community it lacks basic social amenities such as good roads, water supply and electricity among others and has only one functioning health centre. Main occupation of the people is subsistent farming and petty trading with resultant low income.

MATERIALS AND METHODS

This study was a descriptive survey comprising 100 women of child bearing age (15-45 years) attending Akpuoga Nike Health Centre in Enugu State, South Eastern Nigeria. Convenience non probability sampling method was used to select the sample size.

Researchers' developed questionnaire and focus group discussions were instruments used for data collection. The Likert's five point scale was used for the attitudinal validity. Its reliability was tested through test re-test method and correlation coefficient test yielded.0.89 at 0.5 level of significance (r = 0.89).

A total of 100 questionnaires were retrieved and analyzed.

The group means±SD were calculated and significant difference between means evaluated by analysis of variance (ANOVA). Post test analysis was done using the Tukey-Krammer multiple comparison tests. Values of $P < 0.05$ were considered as statistically significant.

RESULTS

Table 1 shows the age distribution of respondents, 70% of the respondents are within the age range of 25-34 years. While 60% of respondents have no formal education, 10% of them had tertiary education (Table 2). Majority of the respondents are involved in trading (58%) as shown in Table 3. Seventy percent of the respondents earn N 20,000.00 and below, while only 10% have an income of 31,000 and above as shown (Table 4). Sixty percent (60%) of the respondents agreed that they feed their babies with soy bean products while 40% indicated that they have never used any form of soy bean products in the nutrition of their children. The respondents in their mean rating agreed that soy bean has positive features

Table 1: Age distribution of respondents

Age (yrs)	Frequency	Percentage
15 24	12	12
25 34	70	70
35-44	18	18
Total	100	100

Table 2: Educational level of respondents

Education	Frequency	Percentage
No formal education	60	60
Primary Educational	20	20
Secondary education	10	10
Treatment Educational	10	10
Total	100	100

Tabel 3: Occupation of respondents

Occupation	Frequency	Percentage
Trading	58	58
Civil servant	291	29
Full time housewife	13	13
Total	100	100

Table 4: Respondents' income

Income per month	Frequency	Percentage
No income	13	13
Below or equal to N10,000	20	20
11,000-20,000	37	37
21,000-30,000	20	20
31,000-40,000	10	10
Total	100	100

Table 5a: Mean rating responses to positive features of soy bean products

Features	Mean	SD
Nutritive	2.17	1.03
Cheap	3.02	0.81
Good alternative	2.27	0.776
Sweet	1.95	0.85
Therapeutic	1.61	1.27
Accessible	2.30	0.56
Smells nice	2.00	0.68
Total	2.18	0.60

Table 5b: Mean rating responses to features of soy bean products according to age

Age	N	Mean	SD	ANOVA Test of Equality of Mean
15-24	12	1.84	0.54	P< 0.05
25-34	70	2.03	0.46	
35-44	18	3.00	0.45	
Total	100	2.18	0.60	

Table 5c: Mean rating responses to positive features of soy bean products according to educational status

Education	N	Mean	SD	ANOVA Test of Equality of Mean
No formal education	60	1.97	0.41	
Primary education	20	1.92	0.38	
Secondary education	10	3.08	0.39	
Tertiary education	10	3.07	0.50	P < 0.05
Total	100	2.188	0.60	

Table 5d: Mean rating responses to positive features of soy bean products according to occupation

Occupation	N	Mean	SD	ANOVA Test of Equality of Mean
Trading	58	2.00	0.41	
Civil servant	29	2.63	0.74	
Full time housewife	13	2.04	0.50	P < 0.05
Total	100	2.18	0.60	

Table 5e: Mean rating responses to positive features of soy bean products according to their status of income.

Income	N	Mean	SD	ANOVA Test of Equality of Means
No income	13	2.06	0.56	
≤ 10,000	20	2.16	0.54	
11,000-20,0000	37	2.09	0.51	
21,000b- 30,0000	20	2.20	0.69	
31,000-40,000	10	2.72	0.72	P < 0.05
Total	100	2.18	0.60	

Table 6a: Mean rating responses to negative features of soy bean products

Not easy to prepare	2.75	0.68
Harmful	2.79	0.9
Foul odor and taste	2.88	0.74
Abdominal flatulence	2.69	1.01
Fear of safety	2.40	1.15
Stomach upset	2.75	0.95
Diarrhea	2.69	0.82
Vomiting	2.70	0.88
Total	2.71	0.61

Table 6b: Mean rating responses to negative features of soy bean products according o age

Age	N	Mean	SD	ANOVA Test of Equality of Mean
15 -24	12	3.05	0.40	
25-34	70	2.81	0.57	
35 -44	18	2.08	0.40	P < 0.05
Total	100	2.71	0.61	

Table 6c: Mean rating responses to negative features of soy bean products according to educational level

Education (Edu)	N	Mean	SD	ANOVA Test
No formal Edu	60	2.80	0.54	
Primary Edu	20	3.06	0.44	
Secondary Edu	10	2.22	0.41	
Tertiary Edu	10	1.92	0.51	P < 0. 05
Total	100	2.71	0.61	

Table 6d: Mean rating responses to negative features of soy bean products according to occupation

Occupation	N	Mean	SD	ANOVA Test
Trading	58	2.84	0.55	
Civil servant	29	2.44	0.66	
Full time House wife	13	2.75	0.58	P < 0. 05
Total	100	2.71	0.61	

Table 6e: Mean rating responses to negative features of soy bean products according to their income status

Income	N	Mean	SD	ANOVA Test
≤ 10,000 13	2.77	0.66		
11,000-20,000	20	2.74	0.65	
31,000 -40,000	34	2.73	0.63	
	20	2.78	0.44	
	10	2.35	0.64	P < .0. 05
Total	100	2.71	0.61	

like being accessible, cheap and nutritive and a good alternative of protein (Table 5a). ANOVA tests showed significant differences (P < 0.5) in their mean rating to the positive features in terms of Age (Table 5b); Educational status (Table 5c); occupation (Table 5d) and Income (Table 5e), respectively.

The respondents in their mean rating also agreed that soy bean has negative features (Table 6a). According to their rating, soy bean is not easy to prepare, has foul odor and taste, causes abdominal flatulence, stomach upset, diarrhea and vomiting. ANOVA tests showed significant differences (P < 0.05) in their mean rating to the negative features in terms of Age (Table 6b); Educational level (Table 6c) and occupation (Table 6d), respectively; but no significant difference (P < 0.05) in terms of income (Table 6e).

DISCUSSION

This descriptive survey examined the need for mothers to use soy bean products as a cheap alternative source of protein in their child nutrition.

From the respondents' mean rating to positive features of soy bean products, soy bean has positive features like being cheap, accessible, a good alternative to protein and is nutritive. This result supports the findings of Abiodun (1991) who found that soy beans products are of high nutritive value and readily available at a cheap rate. Also the finding is in line with the findings of Quak and Tan (1998) who observed that Asian mothers prefer to use soy products during weaning because of its availability, soft consistency and high nutritional value.

The subjects however disagreed to the therapeutic effect of soy bean products as evidenced in their mean rating. This result differs from the findings of Abiodun (1991) who found that commercially available soymilk and home made soymilk have been shown to decrease the severity and duration of diarrhea while stimulating weight gain. Other studies have cited the health benefits of soy beans products. Studies on the use of soy bean products in children have shown that soy eases constipation (Lacono *et al*., 1998), combats diarrhea and lowers high cholesterol (Widhalm *et al*., 1993).

The findings of this study could probably be attributed to the level of education of the subjects as majority of them had no formal education. Subjects' means rating to the positive features in terms of age, educational status, occupation and income showed that there were significant differences between means. This means that the variables under study had a significant influence on the positive features of soy beans products.

This result supports the findings of Adetayo *et al*. (2001) who found a significant relationship between age, education, occupation and the use of soy bean products.

On the negative features of soy bean, subjects in their mean rating also agreed that Soy bean products are not easy to prepare, has foul odor and taste and causes abdominal flatulence, stomach upset, diarrhea and vomiting. This result differs from the findings of Abiodun (1991) who found that soy bean products are easy to prepare and are well tolerated. The result does not also support the findings of Quak and Tan (1998) who observed that Asian mothers' preference for the use of soy milk was due to its high palatability. Also studies by researchers at the University of Illinois have found that soy beans-enhanced food can add variety to children's

diets without sacrificing nutrient value, taste and energy (Endres *et al*., 2004). Although findings on the negative features of soy beans seem to be in line with claims from the opponents of soy bean products which stated that use of soy beans are not appropriate foods for infants or children because of its adverse health effects (Neustaedter, 2004).

Also there has been no published human research to support the claim that soy bean has adverse effects on Asian children or other children who consume it (Chapman, 2004).

Subjects' means rating to negative features in terms of age, education level and occupation, respectively showed significant differences. However, there was no significant difference in terms of income status. This means that their level of income had no significant influence on their mean rating to negative features of soy bean. Any observed difference is due to chance.

Based on the above findings and discussions, there is need for advocacy to the mothers on the use of soy bean products to improve the diets of their children who are at high risk for consuming a protein nutrient-poor diet.

Conclusion: Soy bean products remain an important alternative source of protein for children in rural communities such as Akpuoga Community in Enugu State. This is because it is cheaper than animal protein, accessible and nutritive for such low income population where seventy percent of the population earns less than twenty thousand naira per month.

REFERENCES

Abiodun, P.O., 1991. Use of soy beans for the dietary prevention and management of malnutrition in Nigeria. Acta Pediatr Scand: Suppl., 374: 175-182.

Adetayo, E.A., O.F. Olaniyan and B.O. Ogunba, 2001. Factors influencing soy bean utilization in household consumer market, retrieved on 1/23/2008 at http://www.sciencedirect.com

Chapman, N., 2004. Current knowledge on soy and children's diet. Prepared for United Soybean Board (USB); Washington DC.

Endres, J., S. Barter, P. Theodora and P. Welch, 2004. Soy-enhanced lunch acceptance by preschoolers, J. Am. Diet Assoc., 103: 346-351.

Federal Ministry of Agriculture, 2005. Nigeria Food Balance Sheet.

Food and Agricultural Organization, 2001. Report of FAO and UNO on the state of the world's childhood nutrition.

Hill, L.W. and H.C. Stuart, 1929. Soy bean food preparation for feeding infants with milk idiosyncrasy. J. Am. Med. Assoc., 93: 985-987.

Lacono, G., F. Cavataio, G. Montalto, A. Florena and M. Tumminello, 1998. Intolerance of cow's milk and chronic constipation in children. N. Eng. J. Med., 339: 1100-4.

McVeigh, B.L., B.L. Dillingham, J.W. Lampe and A.M. Duncan, 2006. Effect of soy protein varying in isoflavone content on serum lipids in health young me. Am. J. Clin. Nutr., 83: 244-251.

Neustaedter, R., 2004. Soy unsafe for Children-Excerpt from Child Health Guide, North Atlantic Books.

Quak, S.H. and S.P. Tan, 1998. Use of Soy protein formula and soy food for feeding infants and children in Asia. Am. J. Clin. Nutr., 68: 1444-1446.

Ruhrah, J., 1990. The soy bean in infant feeding: Preliminary report. Achieves of Pediatrics, 26: 496-501.

Seppo, L., R. Korpela, B. Lonnerdal, L. Metsanitty, A. Paganus and T. Vanto, 2005. A fellow up study on nutrient intake, nutritional status and growth of infants with cow or extensively hydrolyzed whey formula. Am. J. Clin. Nutr., 82: 140-145.

Trock, B.J., L. Hilakiri-Clarke and R. Clarke, 2006. Meta analysis of soy intake and breast cancer risk. J. National Cancer Institute, 98: 459-471.

Widhalm, K., G. Brazda, B. Schneider and S. Kohl, 1993. Effects of soy protein diet versus standard low fat, low cholesterol diet on lipid and lipoprotein levels in children.

World Health Organization, 2003. Report on childhood malnutrition. Fifty-sixth World Health Assembly. WH: Geneva.

Wu, A.H., P. Wan, J. Hankin, C.C. Tseng, M.C. Yu and M.C. Pike, 2002. Adolescent and adult soy intake and risk of breast cancer in Asian-Americans. Carcinogenesis, 23: 1491-1496.

Zhan, S. and S.C. Ho, 2005. Meta analysis of the effects of soy protein containing isoflavones on the lipid profile. Am. J. Clin. Nutr., 81: 390-408.