

EVALUATION OF WEANING FOOD “KHITCHRI” INCORPORATED WITH DIFFERENT LEVELS OF FISH PROTEIN CONCENTRATE

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ABSTRACT

Weaning food (khitchri, traditional weaning food) incorporated with different levels of fish protein concentrate (FPC) was evaluated, using albino rats as the experimental animals. The protein efficiency ratio (PER), net protein utilization (NPU), true digestibility (TD) and biological value (BV) were estimated for each level. In khitchri with 10 % FPC, these values were significantly higher than those with 5 % FPC, 2.5 % FPC and without FPC except TD, which was slightly lesser in khitchri with 5 % FPC, but exceeded by the value of khitchri without FPC. Fish protein concentrate (FPC) may be an ideal source of protein for enriching the khitchri.

Key words: Fish Protein Concentrate (FPC), Weaning Food, Enriched Khitchri, Biological Value.

INTRODUCTION

Weaning is the process of changing from breast or bottle feeding to spoon. The baby will start to cut down on milk as the amount of solid food increases. At this stage, small quantities of protein foods, for example meat and fish should be included to replace the loss from the decreasing milk (Thomson and Olney, 2002). In recent years, supplies of conventional protein foods throughout the world are inadequate, which have caused considerable. Interest to be taken not only in improving the methods of production for such foods, but also in the introduction of new protein sources. The nutritional quality of the food protein is mainly determined by the composition of essential amino acids and by the digestibility of the protein (Chang and Satterlee, 1981). From a nutritional standpoint, man can not easily survive on bread diet or on a diet consisting mostly of cereal grains because all cereal grains are low in content and quality of protein (Scrimshaw and Bressani, 1960). These are particularly low in lysine, an essential amino acid.

Lysine is essential because it is not being synthesized by the body and it must be supplied exogenously in the form of animal protein or a balanced vegetable protein. A practical way to supplement this nutritional deficiency is by eating meat, fish and dairy products which supply high quality proteins.

The problem, therefore, resolves itself simply to the finding of an inexpensive way to fortify or to supplement bread and all other bakery products, as well as the cereal grains, with an inexpensive high quality protein that is properly preserved and stabilized to retain its nutritive quality and which will particularly supply the necessary lysine and methionine of which there is serious

shortage. Fish protein may represent a key constituent of fish with glucoregulatory activity (Lavigne *et al.*, 2001). Fish protein concentrate, when correctly processed met the desired requirements except nonfat milk powder thus, fish rich in lysine and low in methionine supplement rice and other cereals which were rich in methionine and low in lysine. Increase in the body weight is a desirable character in the growing children. Supplementing the diet with 2% CP during the prepubertal period increased body weight (Shamay *et. al* 2005).

Taking into consideration these beneficial aspects of FPC the present study was designed to incorporate FPC in conventional khitchri as a supplement and its nutritional evaluation.

MATERIALS AND METHODS

The fish protein concentrate thus obtained was used for the analysis of food protein by kjeldhal method, moisture contents were determined at 105 °C, ash at 600 °C and fat by CHCL₃ extraction according to AOAC (1984) method. Experimental diet was formulated using different levels of fish protein concentrate and its proximate analysis was carried out according to AOAC (1984) method.

Net protein utilization (NPU): It was determined by the method followed by Miller and Bender (1955). Weanling albino rats about 21 days of age and weighing about 30-40 g were randomly divided into 5 equal groups, six in each group. One group was fed on “khitchri” with 10% FPC, while the other groups on khitchri with 5 % FPC, with 2.5 % FPC, khitchri without FPC and control diet respectively. All experimental groups were reared in separate wire cages with raised platform under optimal

conditions of management. Water was available adlibitum. Feed intake was measured every day and spoiled diet was collected daily and used to calculate the amount of feed intake. The rats were weighed every third day for 10 days. After 10 days, the rats were sacrificed and carcasses were dried to a constant weight. The nitrogen contents were calculated by applying the formula $N/H_2O \times 100 = 4$ and the NPU were calculated by using following equation.

$$NPU = B - BK + 1K/I$$

Where B and BK are the total body nitrogen for the animal fed on the test and non-protein diet respectively, and I and IK are the intake of nitrogen in two groups.

Protein efficiency ratio (PER): It was determined by the method described by Osborn *et al.* (1919)

True digestibility (TD): It was determined by the method used by Miller and Bender (1955) and was calculated by the application of following formula:

$$TD = I(F - FK) / I$$

Where F and FK are the total nitrogen of the faeces of test and control diet groups respectively.

Biological value (BV): It was determined by the method described by Miller and Bender (1955) and was calculated by using the following formula:

$$BV = NPU/D$$

Where D is the digestibility. All feeding trials were executed in triplicate.

RESULTS AND DISCUSSION

The composition of fish protein concentrate is given in Table-I, FPC comprised of 63.8 % protein, 7.26 % fat and 1.27 % carbohydrates. Table II, shows the composition of non protein diet which includes cooking fat 15 %, potato starch 10 %, glucose 15 %, vitaminized carbohydrates 5 %, salt mixture 5 % and maize starch 50 %. Table-III, shows the proximate composition of weaning food (khitchri) incorporated with different levels of fish protein concentrate. It is obvious from the results that protein contents of khitchri were increased to 19.86 % with incorporation of 10 % FPC, 17.5 % FPC with 5 % FPC and 15.11 % FPC with 2.5 % FPC. Similarly fat contents were also increased with incorporation of FPC. While, moisture contents of weaning food (khitchri) were decreased with incorporation of FPC.

Nutritional value of weaning food incorporated with different levels of FPC, using nitrogen balance procedures are presented in Table-IV.

The net protein utilization for khitchri without FPC was found to be 48%, the corresponding value of khitchri with 10% FPC was 65%, higher than other values at 5% FPC, 2.5% FPC and control diet which were 60%, 55% and 42% respectively. The biological value of khitchri without FPC was found to be 56%, which after

incorporation with 2.5 % FPC, 5 % FPC and 10 % FPC were significantly increased to 63%, 67% and 73% respectively that were greater than control diet i.e., 52 %.

True digestibility (TD) of khitchri with 10% FPC was found to be 88% slightly lesser than khitchri with 5% FPC, but was greater than khitchri without FPC and control diet.

Protein efficiency ratio (PER) of khitchri without FPC, and with 10% FPC, 5% FPC, 2.5 % FPC and control diet were found to be 1.18, 3.28, 2.98 and 2.65 respectively. The result obtained were in accordance with the findings of Askari *et al.*, 1993, while evaluating nutritional value of protein in squid present in the diet at 10% protein level.

Overall the findings of the present studies were non significant as compared with control group.

Conclusion: In the light of results derived from the present studies it can be concluded that, to evaluate the nutritional effect of incorporating FPC in weaning food (khitchri) of particular interest is the magnitude of difference in nutritional quality. Values such as NPU, BV, PER and TD show remarkable improvement in weaning food incorporated with 10% FPC indicating that addition of 10% FPC to khitchri can result in superior nutritional quality.

Two important aspects taken in consideration for assessing protein supplemented foods are the effect of quality and quantity of proteins in the product. The present study revealed that addition of fish protein concentrate to weaning food (khitchri) increased both the quality and quantity of protein.

Table- 1: Composition of Fish Protein Concentrate

S. no.	Parameters	Percent (%)
1	Protein	63.80
2	Fat	7.26
3	Carbohydrate	1.27
4	Ash	23.4
5	Moisture	4.27

Table-II: Composition of Non Protein Diet

S. no.	Ingredients	Percent (%)
1	Cooking Fat	15
2	Potato Starch	10
3	Glucose	15
4	Vitaminized Carbohydrates	5
5	Salt Mixture	5
6	Maize Starch	50

Table- III: Proximate Composition of Diet “Khitchri” Incorporated With Different Levels of FPC

Diet	Moisture %	Fat %	Protein %	Ash %
Khitchri without FPC	3.72	8.80	13.31	0.95
Khitchri with 10% FPC	2.10	9.49	19.86	2.68
Khitchri with 5% FPC	2.36	9.14	17.50	1.84
Khitchri with 2.5% FPC	2.53	8.95	15.11	1.27

Table-IV: Effect of Supplementing “Khitchri” with Various Levels of FPC

Diet	NPU	BV	TD	PER
Khitchri without FPC	48.00	56.00	85.02	1.18
Khitchri with 10% FPC	65.00	73.00	88.00	3.28
Khitchri with 5% FPC	60.00	67.00	89.00	2.98
Khitchri with 2.5% FPC	55.00	63.00	86.00	
Control Diet	42.00	52.00	80.00	1.00

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