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# PROXIMATE, AMINO ACID, MINERALS AND VITAMINS ANALYSIS OF FISH WASTE FROM FISH MARKET AT CHIDAMBARAM, TAMIL NADU

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## ABSTRACT

Menopause is acknowledged as the permanent cessation of menses for 1 year and is physiologically correlated with the decline in oestrogen secretion resulting from the loss of follicular function. It is the transition phase of female which affects reproductive and sexual life. Most commonly females attained menopause after the age of 40 years or more, as it is due to hormonal changes occurring in the body that makes them vulnerable to deal with many consequences physiological and sometime pathological too. The age at menopause attained is crucial and keep the public health and clinical interest as it may reveal health and aging. Menopause and climacteric are peculiar to the human race, but in lower animals ovulation and fertility continues up to old age. In Unani system of medicine, there is no exact description of menopause but it can be revealed under *Ehtibase Tams* (cessation of menstruation) and can be correlated with *Sinne Yaas* (age of natural termination of menstruation). Zakariya maintains that menstruation ceases due to dominance of *Barid* (cold) and viscous *Akhlat* (humours) near the vicinity of uterus or its vessels due to obstruction or increased viscosity of blood. Ibn Sina stated it is the weakness of *Quwate Dafiya* (faculty of excretion) of the body which alter the normal cycle and ultimately stops the cycle. *Sinne Yaas* is the transition from reproductive to non reproductive state usually achieved at the age of 50 years, sometimes at the age of 40 years too. In this review paper we will try to evaluate the hidden truth about menopause stated in Unani system of medicine and possible treatment available after attaining the physiological milestone in a women's life.

## INTRODUCTION

Global fishery productions in marine waters were 82.6 million tons in 2011 and 79.7 million tons in 2012 [1]. The continuous increase in global fish resources results in 25% of wastage among total fish catch annually [2]. The fish industry still generates large quantities of by-products, mainly because of fish processing and discards [3]. Although, these waste are commonly employed to obtain low value products such as fish silage or fertilizer. In India, fishing industries could play a bigger role in giving rise to the new industrial sector of biodiesel production by supplying its by-product to the biodiesel processing industries. Hence, biodiesel production from fish may leads to the control of solid waste generated from fish industries and helps in improving Indian economy [4].

About 35 percent of fishmeal is already produced using fish-processing by-products. Under one of the above scenarios, increased utilization of wastes could significantly increase fishmeal availability and boost aquaculture production. In many countries, solid waste is recycled into fish meal plants or treated along with the municipal waste, whereas liquid waste is disposed of through the municipal sewage system or directly into a water body. Fishmeal is known to contain complete Essential amino acid (EAA) profile that is needed to meet the protein requirement of most fish species. Fishmeal is recognized by nutritionists as a high-quality, very digestible feed ingredient that is favoured for addition to the diet of most farm animals, especially fish and shrimp. Fishmeal carries large quantities of energy per unit weight and is an excellent source of protein, lipids (oils), minerals, and vitamins; there is very little carbohydrate in fishmeal [5]. It is a generic term for a nutrient-rich feed ingredient used primarily in diets for domestic animals, sometimes used as a high-quality organic fertilizer. Fishmeal can be made from almost any type of seafood but is generally manufactured from wild-caught, small marine fish that contain a high percentage of bones and oil, and usually deemed not suitable for direct human consumption. These fishes are considered ‘industrial’ since most of them are caught for the sole purpose of fishmeal and fish oil production. A small percentage of fishmeal is rendered from the by-catch of other fisheries, and by-products or trimmings created during processing (e.g., fish filleting and cannery operations) of various seafood products destined for direct human consumption [5].

Commercial broiler production has become a specialized and speedy poultry operation during the recent years all over the world. Total consumption of poultry meat and eggs has increased

dramatically during the past five decades and continues to increase ahead of human population growth. The broiler industry demands a fast growing chicks and good quality feed with high level of energy, protein, vitamins and essential minerals to support maximum growth before the birds are ready to sale. For the survivability of broiler industry, the production cost should be kept as minimum as possible. Cost of feed incurs about 60-65% of the total cost of poultry production and protein costs about 13% of the total feed cost [6].

In Chidambaram fish market area this fish wastes are treated as trace thinks, which are dumped in wastages. Instead of wasting them, these fish wastes can also use in fish oil production. The present study revealed the proximate composition, fatty acid level of trace fish.

## MATERIALS AND METHOD

### Sample collection:

The studied samples were collected from fish market at Chidambaram, Tamil nadu. The collected samples were weighed (250g) and divided into several portions in separate polyethene bags. The sample bags were labelled and stored in deep freezer at -20◦C for further analysis.

### Sample preparation:

The collected fish wastes were separated into three divisions. One part was allowed to dry in an electric oven at 75°C (30 Min.) for proper drying this was took as a raw fish meal. Another two parts of fish waste ware used to extract fish oil by Bligh & Dyer and Direct Streaming; by this method we got some solid wastes. These processed solid wastes and raw dried fish meal were stored for below mentioned estimations.

### Estimation of protein:

The Folin-Ciocalteu Phenol method of Lowry *et al.*, (1951) was used for the estimation of total protein in the solid waste of fish meal [7].

### Estimation of lipid:

The total lipid content was estimated gravimetrically by following Folch *et al*., 1957 [8].

### Estimation of carbohydrate:

The total carbohydrate was estimated by phenol-sulphuric acid method of Dubois *et al.*, 1956 [9].

### Estimation of Amino acids:

The experimental samples were finely ground for estimating the amino acids in the HPLC (Merck Hitachi L-7400) following the method of Baker *et al.*, 1994 [10]

**Estimation of Vitamins:**

The water soluble vitamins $B_1$, $B_3$, $B_6$, vitamin C, and choline were analyzed in the HPLC (Merk Hitachi L-74000) following the method described by Sadasivam and Manickam, 1996 [11]. The folic acid was estimated by following the calorimetric procedure of Sethi, 1997 [12].

**Estimation of Minerals**

The minerals were estimated by following the method of Guzman and Jimenez (1992) [13].

**Moisture content**:

The moisture content of the fish wastes was estimated by drying a known weight (1 g) of fish waste in a hot air oven at 105°C for 24 hrs. The difference in weight before and after drying is the amount of moisture present and the results are expressed in percentage of wet weight of the meal. (AOAC, 2000) [14].

**Ash:**

The ash content was estimated by burning oven-dried sample in a Muffler furnace at 550°C. (AOAC, 2000) [14].

**RESULTS**

**Estimation of proximate composition:**

For the present study, the proximate analysis of raw dried fish waste, solid waste of fish obtained from Bligh & Dyer and Direct Streaming method were made for relative assessment of essential nutritive parameters. The percentage composition of ash, carbohydrate, protein, fat, moisture, vitamins, minerals and amino acids were measured with appropriate units by adopting standard methods.

The proximate composition of solid sample of fish waste from Direct Streaming was shown moderate levels of vital nutritive values. The protein content was observed major level in P3 (65.4%) and second largest amount was found at P1 (51.44 %). Fat content was found as a second major content in these all samples it was recorded as 19.56%, 14.09 and 12.33 % at P3, P1 and P2 respectively. Carbohydrate having good percentage in three investigated sample 3.44% and 2.91 and 1.99% are recorded as highest level on P1, P2 and P3 respectively. Amino acid, moisture and ash content are present in normal sensible level in all samples. The results were shown in Table 1.

| Proximate | P1 (%) | P2 (%) | P3 (%) |
|---|---|---|---|
| PROTEIN | 51.3 | 47.3 | 65.4 |
| CARBOHYDRATE | 3.44 | 2.91 | 1.99 |
| FAT | 14.09 | 12.33 | 19.56 |
| AMINO ACID | 6.16 | 5.19 | 11.3 |
| MOISTURE | 2.09 | 1.46 | 1.39 |
| ASH | 7.56 | 6.33 | 9.93 |

**Table No: 1.** Proximate composition of different fish solid wastes.

**P1**- Direct streaming method,

**P2-** Bligh and Dyer method,

**P3-** Raw fish waste.

**Estimation of Minerals:**

The minerals are present very good level in an investigated all fish wastes. Totally eleven minerals were identified in all samples. In this result Calcium (489.3-678.5%), phosphorus (193.5-253.5%), chloride (122.4-189.3%) and potassium (120.5-212.6%) are observed as highest level in all investigated species. In this result shows P3 showing highest concentration of minerals and followed by P2 and P1 in this order. The results were shown in Table 2.

| MINERALS | P1(mg) | P2(mg) | P3(mg) |
|---|---|---|---|
| MAGNESIUM | 12.3 | 12.9 | 15.6 |
| SODIUM | 25.6 | 34.9 | 46.6 |
| POTASSIUM | 120.5 | 156.7 | 212.6 |
| COPPER | 0.021 | In traces | In traces |
| ZINC | 0.567 | 1.23 | 0.31 |
| SULPHUR | 4.34 | 2.91 | 0.89 |
| CHLORIDE | 122.4 | 145.7 | 189.3 |
| PHOSPHORUS | 245.6 | 193.5 | 253.5 |
| IRON | 5.63 | 4.08 | 6.93 |
| CALCIUM | 567.2 | 489.3 | 678.5 |
| SELENIUM | 0.0001 | 0.0004 | 0.0001 |

**Table No. 2.** Mineral analysis of different fish solid waste.

**Estimation of Vitamins:**

In this current investigation totally 6 vitamins are observed in all fish waste samples. They are Vitamin $B_1$, $B_3$, $B_6$ C, folic acid and Cholin. The moderate levels of vitamins were observed which has $B_1$ (0,011-0.044 mg/g.) $B_3$ (1.19-1.39mg/g.), Vitamin C (3.5-2.91 mg/g), Folic acid (0.001-0.004) Choline (26.6- 58.9) and vitamin $B_6$ are observed trace level in all investigated sample. By the result P3 sample having highest level of vitamins compared with other two. The results were shown in Table 3.

| VITAMINS | P1(mg) | P2(mg) | P3(mg) |
|---|---|---|---|
| $B_1$ | 0.021 | 0.011 | 0.044 |
| $B_3$ | 1.24 | 1.19 | 1.39 |
| $B_6$ | In traces | In traces | In traces |
| Vitamin C | 3.5 | 2.91 | 5.94 |
| FOLIC ACID | 0.001 | 0.002 | 0.004 |
| CHOLINE | 45.3 | 26.6 | 58.9 |

**Table No.3.** Vitamin analysis of different fish solid wastes

**DISCUSSION**

Performance of dietary fish towards the utilization of fish waste will be a cheap alternative animal protein source for sustainable aquaculture. The most important nutrient that has to be present in fish wastes like, Protein, Carbohydrate, Fat, Vitamin, Mineral and Amino acids.

In the present evaluation of protein content in fish waste of dried raw sample was 65.4% followed by Direct stream method and Bligh & Dyer method of 51.3% and 47.3% respectively. The fish tissue have higher amount of protein and fat content to increase the growth of animals. The fat nature is reduced in the fish, since the fatty components were extracted for the production of fish oil. The dried raw fish waste contains the fat value of 19.56%, on the Direct streaming method the fish wastes contains 14.09% fat. Bligh and Dyer method has 12.33%. In the present study, 12.33% of fat content was noticed as lowest level in P2 fish waste sample. Due to the oil extraction study of Bligh and Dyer method produced more quantity of fish oil when compare to other two methods. Khan *et al.*, (2012) were determined on different species used for the production of fish meal in Pakistan and to determine the proximate composition of fish meal. Results of the proximate analysis revealed more than 60% crude protein (CP) in the fish meal

sample. Crude fat ranged from 9.9% to 29.5%, ash content 12.7 to 28.2% and gross energy 4,118 to 4,883cal/g [15]. Adedokun *et al*., (2016) recorded the nutrient compositions of feed ingredients of imported fish meal (IFM) and smoked fish waste meal (SFWM). The crude protein of IFM and SFWM value were 72.26 and 68.07 respectively. [16]

The Carbohydrate in raw fish-waste was estimated in 1.99%. In Direct Streaming and Bligh & Dyer method, it seems to be high due to the reaction of organic solvents and boiling the fish meal. The Vitamins and Minerals of dried raw fish waste were noticed as higher than other two methods. The dropping of vitamins and mineral concentration might be due to the de-maturing of oil extraction process and organic solvents procedures in the fish meal.

The amount of moisture content in *Euthynnus affinis* (tuna) waste samples were recorded from 68.79 to 76.74%. The maximum percentage of moisture in tuna waste samples was found in the liver. The lowest protein value of tuna waste samples was noticed in the liver whereas the highest value was found in the head. Ash content varied from 1.10 to 4.77% in tuna. Maximum ash was recovered in the head of tuna. The one way analysis of variance showed significant difference ($P < 0.05$) between the ash content of head and the intestine and liver [17].

Fox et al., (2004) were suggested that the fish meal is used in marine shrimp feeds because it is high in protein, highly digestible and is an effective feed attractant. Reasons for current interest in its replacement include irregular availability, variable quality, and perceived contribution to deterioration of fisheries, potential for adulteration, contamination with hydrocarbons and biological pathogens, and increasing cost [18].

Nandakumar *et al.,* (2013) investigated the effect of replacement of fish meal with processed chicken waste meal (CWM) in the diet of Asian seabass, *Lates calcarifer*. Analysis of CWM showed that it has 53% crude protein and 32% crude lipid. Effect of replacement of fish meal (FM) with CWM was carried out by including CWM at 0, 5, 10, 15 and 20% (W/W) levels in an iso-nitrogenous (40%) and iso-lipidic (10%) diet. the CWM is a potential ingredient in the diet of Asian seabass *L. calcarifer* and it can be included up to 5-10% replacing fish meal. However further studies are needed to optimise the level of CWM in the diet of seabass [19].

The present assessment of proximate composition in dried raw fish waste noticed, ash and moisture content were 9.93% and 1.39% respectively. These values were appeared higher than the other two processed methods.

Stephen *et al.,* (1999) have reported the chemical composition of settle able faecal fish waste was determined from fresh manure samples collected at 12 commercial farms growing rainbow trout *Oncorhynchus mykiss* in Ontario, Canada. The manure samples from the commercial farms averaged 2.83% nitrogen (N), 2.54% phosphorus (P), 0.10% potassium (K), 6.99% calcium (Ca), and 0.53% magnesium (Mg) on a dry-weight basis. The concentrations of the metals, arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr), iron (Fe), mercury (Hg), manganese (Mn), nickel (Ni), lead (Pb), selenium (Se), and zinc (Zn) were also measured. Mean concentrations of these metals ranged from 0.05 mg/kg for Hg to 1,942 mg/kg for Fe. Fresh fish manure has similar levels of N, P, Ca, and Mg, and lower levels of K when compared to manure from beef, dairy cattle, poultry and swine. Fish manure tended to have a higher content of Mn, Cd, Cr, Pb, Fe, and Zn than most other livestock manures, but had lower levels of As, Se, Co, and Ni. The copper (Cu) content of fish manure was similar to all other livestock manures [20].

Fishery products, either in the form of low-value trash fish or rendered as fish meal, are presently the major sources of protein in the grow-out culture of most fish species and constitutes up to 70% by weight of their diet [21]. As the demand for fish meal and marine fishery products for aquaculture increases while their availability decreases, the cost is expected to rise. A dependable supply of cost-effective, non-marine, alternative sources of protein must be provided for fish farming to be profitable.

## CONCLUSION

The Proximate analysis of two by-products of fish meal samples and one standard (raw fish meal) were made for the comparative assessment. The present valuation of protein content in fish meal of raw fish waste was 65.4% followed by direct stream method and Bligh & Dyer method of 51.3% and 47.3% respectively. The by-product fish meal nutritional assessment revealed that it might be superior ingredient of an animal feed preparation.

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