Proximate Analysis of Sardinella Longiceps (Valenciennes,1847)Collected From Sassoon Dock West Coast of Maharashtra,India.

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Abstract- *Fish has been main food source for humankind worldwide from ancient period. All over the country, Indian Oil Sardine (Sardinella longiceps) has more economic value due to its nutritional facts.To evaluate the nutritional value of Sardinella longicepsits proximate composition study was conducted during the period of January 2019 to January 2022.The present research was done to analyze the protein, carbohydrate,lipid and moisture content of the experimental fish. In the present study moisture content was found to be at maximum level followed by proteinand lipid. Carbohydrate was the least content. Proximate analysis study further showed that Indian oil Sardine has high lipid content.*

Keywords- Sardinella longiceps, proximate analysis, nutritional value

I. INTRODUCTION

Figure 1. Sardinella longiceps (Valenciennes 1847)

For a healthy living, fish in diet contributes much needed nutrients and in ancient time also fish was available inrural areas and for poor people of many developing countries like India (Vijayakumar *et al*., 2014).The macro and micro nutrients like protein, moisture, lipid carbohydrate, vitamins, present in the fish flesh add nutritional value to the fish (Kumar et al.,2020).It has been proven that intake of small amount of fish protein on regular basis can reduce the risk of several digestive track cancer (Fernandez et al., 1999).

The Sardinella longiceps commonly known as oil sardines have fish oil which contain omega-3 polysaturated fatty acid and protein which are good dietary source for consumption (Bahurmiz, O. M et al, 2017). Fish oil specially EPA and DHA of Omega-3 also helps in development of reproductive system, nervous system and sense of vision (Leaf and Weber, 1988; Simopoulos, 1991; Gustafsson et al., 1992; Kris-Etherton et al., 2002; Sidhu, 2003; Cahu et al., 2004, R. Sharma, J. Katz, .2013). It has been recently found that gut of Sardinella longiceps contain bacillus (Safensis SDG14) which can be used as enhanced probiotic competence (Bindiya E, 2021)

Protein, Carbohydrate, Lipid like biochemical compositions are essential for body growth and maintenance (Okuzumi and Fujii, 2000). Deficiency of protein leads to vascular dysfunction , anemia , immunity impairment, stunted growth, and other weakness related issues (Wu, G. 2016).Malnutrition of Dietary protein in elderly humans is also seen in developed countries, which make them prone to metabolic and infectious diseases (Dasgupta, M.et al.2005). Deficiency of protein results in many types of metabolic disorders in humans more in children of developing nations (Leser S, 2013). Proximate composition of fish vary greatly with exposure of toxic material, which end up with less nutritional value for humans (Leena Muralidharan,2014).

The present study is an attempt to elucidate the nutritional value of Sardinella longiceps.Since Oil Sardines are locally consumed in favoritism in India the values of proximate composition will be of great use. The Sardinella longiceps contributes 20-30 % of India's total marine landings.Proximate body composition analysis is a good indicator of the physiological condition of a fish though the values vary in considerable amount within species, their size, feeding habitat, physiological and sex condition (Ali.et al., 2005). Present study was conducted to understand the

nutritional value of Sardinella longiceps collected from Sassoon dock, Mumbai.

Human population as 7.9 billion on January 2022(U.S. Census Bureau) is increasing many folds per second and due to inadequate intake and unawareness of nutrients health of each individual is taking toll so we need to have immediate accelerate towards progress to all areas of nutrition.

II. MATERIALS AND METHODS

Fig. 1 Sassoon Dock, Mumbai.

The study area Sassoon Dock (Figure 1) is located between latitude 18° 54' 37.692" N and Longitude 72° 49' 2.172" E. The fish used in this study were collected in early morning freshly direct from Sassoon Dock Mumbai with the help of local fisherman at Sassoon Dock.Fresh fish was bought and kept in ice box maintaining optimum temperature and taken directly to lab for practical work. At lab fish were cleaned three times with demineralized water and all lab apparatus, workplace was sterilized to minimize practical error.Sardinella longiceps fish measuring 14-16 cm and weighing 26-27gms selected for the study.

Protein estimation was done by Lowry's method (Lowry's et al 1951). Lipid extraction was done by Folch method (Folch et al 1957.) Moisture content was determined by standard AOAC method (AOAC 2000), carbohydrate was estimated by Anthrone test (Hedgehofreiter 1962).

III. RESULTS AND DISCUSSION

Table 1.Proximate composition values in the muscle of Sardinella longiceps collected from Sassoon dock during the year 2019-2022. Table values reported as mean ± standard deviation .

Parameters	Value of proximate composition in gm %	Significance
Protein	25.71 ±0.20	P < 0.05
Carbohydrate	0.325 ±0.05	P < 0.05
Lipid	11 ±0.25	P < 0.05
Moisture	76 ±0.3	P < 0.05

Table 1. Proximate composition values in the muscle of Sardinella longiceps collected from Sassoon dock during the year 2019-2022.

± indicates standard deviation.

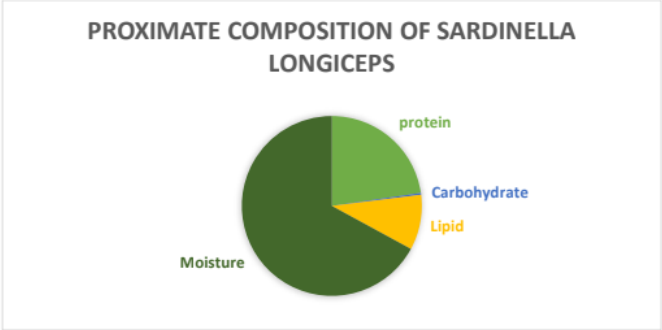

Fig.2 Pie chart showing values of proximate composition of Sardinella longiceps collected from Sassoon dock during Jan 2019-Jan2022.

The proximate composition in muscle tissues of Sardinella longiceps collected from Sassoon dock was estimated during the period of January 2019 to January 2022. The moisture protein lipid and carbohydrate values of the muscle tissue of Sardinella longiceps were analysed and presented in table 1 and figure 2.

The fish Sardinella longiceps showed protein values 25.7mg% rich fish. High muscle protein content in the Sardinella longiceps could be contributed to their high protein content in their diet. The nature of food has effect on protein composition of fish. High protein content could also be due to its planktonic feeding nature.

Lipids are storage form of energy in living organisms.In the present study Sardinella longiceps lies well in high fat fish category due to its high lipid content(Ackman

RG (1990). It could be also due to heavy metal contamination present in the aquatic ecosystem. The observation indicates that high lipid content, it is also due to feeding conditions, level of food supply and on growth.

Carbohydrate levels are found to be moderate in muscles. Values obtained for carbohydrate is in concordance with Jamila P, et al.2021Glycogen present in the aquatic animals do not significantly contribute to the total reserve of the fish body (Jayasree, V.1994). Decrease in carbohydrate level observed could be attributed to increased energy demand for gonadal maturation and growth. Disturbance in proximate composition of fishes indicate that microplastic in the ecosystem could impose alteration of biochemistry of fish leading to disturbed metabolism. Sheeba et al ,2021 also reported that less carbohydrate content in fish Sardinella longiceps. Archana Oza also reported high risk damages are caused to marine fish due to stress of pollution (Archana.Oza,Leena Muralidharan,2018)

Moisture being major constituent in flesh of fish can reduce the fish quality if preserved for longer period of time .High moisture content is known to degrade the polyunsaturated fatty acids and subsequently making fish more vulnerable for microorganism to spoil the fish (O. Abass et al,2012) .High moisture plays vital role in metabolic reactions by solubilizing certain elements.In the present study mean values of moisture content was 76 gm%. Its high moisture content showed that Sardinella longiceps is highly perishable fish. It is said by Olsson et al in 2002 that the value of proximate composition varies greatly from species to species, from individual to individual depending on their feeding habit, season environment and sex (Olsson et al, 2002).

IV. CONCLUSION

Sardinella longiceps is an affordable, locally available edible fish. From the present study it can be concluded that Sardinella longiceps is a nutritious fish with high protein, moisture and lipid content. Further study has to be done on pollution stress and accumulation of microplastic in aquatic ecosystem that could damage the nutritional value of the fish.

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REFERENCES

[1] Ackman RG (1990) Nutritional composition of fats in seafood's. Prog. Food Nutritional Science 13: 161-241.

[2] Ali, M., Iqbal, F., Salam, A., Iram, S. and Athar, M. (2005)Comparativestudy of body composition of different fish species from brackishwater pond. Int. J. Environ. Sci. Technol.2 (4): 359-364.

[3] Archana Oza, Leena Muralidharan,(2018).Seasonal study on bioaccumulation of heavy metal, lead invarious tissues of fish, Harpodonnehereuscollected from sassoon dock, mumbai coast of maharshtra, india. international journal of advance research in science and engineering, volume no-07, issue no 04, pg 266-271.

[4] Bahurmiz, O. M., Adzitey, F., & Ng, W. K, (2017). Nutrient and fatty acid composition of the flesh of oil sardine (Sardinella longiceps) and Indian mackerel (Rastrelligerkanagurta) from Hadhramout coast of the Arabian Sea, Yemen. International Food Research Journal, 24, 2387-2393.

[5] Blanchard G, Maunaye M, Martin G. 1984.Removal of heavy metals from waters by means of natural zeolites.Water Research ,Volume 18, 1501-1507.

[6] Bindiya E S, Sarita G.2022 Bhat Indian oil sardine (Sardinella longiceps) gut derived Bacillus safensis SDG14 with enhanced probiotic competence for food and feed applications. Food Research International.,vol 150, 110475.

[7] Cahu, C., Salen, P. and De Lorgeril, M. 2004. Farmed and wild fish in the prevention of cardiovascular diseases: Assessing possible differences in lipid nutritional values. Nutrition, Metabolism and Cardiovascular Diseases 14(1): 34-41.

[8] Dasgupta M., Sharkey J R., Wu G., 2005. Inadequate intakes of indispensable amino acids among home bound older adults'Nutr Elder 2, 24, 85-99.

[9] Fernandez, E., Chatenoud, L., La Vecchia, C., Negri, E. and Franceschi, S. 1999. Fish consumption and cancer risk. The American Journal of Clinical Nutrition 70(1): 85-90.

[10] Folch J, Lees M, Stanley GHS (1957) A simple method for the isolation and purification of total lipids from animal tissues. The Journal of Biological Chemistry 226: 497–509.

[11] Gustafsson, I.B., Vessby, B. and Nydahl, M. 1992. Effects of lipid-lowering diets enriched with monounsaturated and polyunsaturated fatty acids on serum lipoprotein composition in patients with hyperlipoproteinaemia. Atherosclerosis 96(2): 109-118.

[12] Hedge, J E and Hofreiter, B T (1962) In: Carbohydrate Chemistry **17** (Eds Whistler R L and Be Miller, J N) Academic Press New York.

[13] Jamila P, et al.2021., Comparative Studies on the Nutrition of Two Species of Sardine, Sardinella longiceps and Sardinella fimbriata of Southeast Coast of India. Food Sci & Nutri Tech, 6(4): 000272.

[14] Jayasree, V., Parulekar, A.H., Wahidulla, S., Kamat, S.Y., (1994) Seasonal changes in biochemical composition of Holothurialeucospilota (Echinodermata), Indian J. Mar. Sci., 23117-119.

[15] Kris-Etherton, P.M., Harris, W.S. and Appel, L.J. 2002. Fish consumption, fish oil, omega-3 fatty acids, and cardiovascular disease. Circulation 106(21): 2747- 2757

[16] Kumar A, Bajpeyee AK, Yadav CB. (2020). Effects of Dietary vitamin-C on Biochemical and Morphometric parameters of Labeorohita. International Journal of Biological Innovations. 2(2):174-177.

[17] Leaf, A. and Weber, P.C. 1988. Cardiovascular effects of n-3 fatty acids. New England Journal of Medicine 318(9): 549-557.

[18] Leena Muralidharan (2014.)Chronic toxicity studies on proximate composition of Cyprinus carpio exposed to fenthion. International Journal of Fisheries and Aquatic Studies; 1(5): 221-227.

[19] Leser, S., 2013. FAO dietary protein report. Nutrition Bulletin 38, 421-428, https://doi.org/10.1111/nbu.12063.

[20] Lowry, O. H., Rosebrough, N. J., Farr, A. L., and Randall, R. J. (1951) Protein measurement with the Folin phenol reagent. *J. Biol. Chem.* 193, 265–275.

[21] O. Abass, A. Muhammad, S. Mada, A. Mohammed, H. A bdulahi, K. Mahmoud (2012)

[22] Nutrient composition of Tilapia zilli, Hemisynodontismembranacea, Clupeaharengus and Scomberscombrus consumed in zaria World J. Life Sci. Med. Res., 2 pp. 16-18

[23] O.I. Ayanda, G.A. Dedeke, U.I. Ekhator, M.K. Etiebet(20 18), Proximate composition and heavy metal analysis of three aquatic foods in makokoriver,Lagos, NigeriaJ. Food Qual., p. 6.

[24] Okuzumi M and Fujii T, 2000. Nutritional and functional properties of squid and Cuttle fish, Japan national cooperative association of squid processors, Tokyo, Japan, 223.

[25] Olsson GB, Olsen RL, Carlehog M, Ofstad R (2002) Seasonal variation in chemical and sensory characteristics of farmed and wild Atlantic halibut (Hippoglossushippoglossus). Aquaculture 217(1-4): 191-205

[26] Sheeba W, Immaculate JK and Jamila P.,2021. Comparative Studies on the Nutrition of Two Species of Sardine, Sardinella longiceps and Sardinella fimbriata of South East Coast of India. Food Sci & Nutri Tech 6(4): 000272.

[27] Sidhu, K.S. 2003. Health benefits and potential risks related to consumption of fish or fish oil. Regulatory Toxicology and Pharmacology 38(3): 336-344.

[28] Simopoulos, A.P. 1991. Omega-3 fatty acids in health and disease and in growth and development. The American Journal of Clinical Nutrition 54(3): 438-463.

[29] U.S. Census Bureau and globalnutritionreport.org 2022.

[30] Vijayakumar N, Sakthivel D and Anandhan V, 2014.Proximate composition of Clupeidae and Engraulidae inhabiting Thengaithittu estuary Puducherry-Southeast coast of India. International Journal of Science Inventions Today, 3(3): 298-309.

[31] Wu, G. Dietary protein intake and human health. Food & function 2016, 7, 1251-1265, https://doi.org/10.1039/C5FO01530H.