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MACRO – NUTRIENTS OF CICHLID FISHES IN LAKE TIMSAH, EGYPT

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Cichlid fishes are one of the highly economic fishes in Egypt. The study aims to determine the macro – nutrient content for (K, Na, P, Ca, and Mg) of (*Oreochromis niloticus, Coptodon zillii, Oreochromis aureus*, and *Sarotherodon galilaeus*) in Lake Timsah, Egypt. Among studied species, *S. galilaeus* possesses the highest values of nutrients except Ca while *O. niloticus* possesses the lowest values except P and Ca. For elements, 1057 mg/Kg of Mg was the highest while 36 mg/Kg of Ca was the lowest. The conclusion is cichlid fishes have a high nutritional value with remarkable differences among studied species.

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Introduction

In Egypt, cichlids are highly economic fishes, representing most of total Egyptian fish production (58.54% of the total catch), where 7.29% are hunted from natural resources (River Nile and other Egyptian inland waters) and 51.25% are produced by aquaculture [1]. Nutrients are essential minerals; they are the components of many enzymes metabolism and participate in the growth of the human body [2]. Marine foods are very rich sources of mineral components. The contents of fish edible parts are moisture, protein, fats, vitamins and minerals, all together form the overall meat composition [3].

According to their concentrations in an organism, mineral nutrients are generally classified into two major groups: trace “micro” minerals (Cu, Fe, Mn, Se, Zn, Pb, Co, and Cr): below 50 mg / kg BW and macro minerals (Ca, P, Mg, K, Na, and S): above 50 mg / kg BW [4 & 5]. El Timsah Lake is one of attractive place for tourism activity in Ismailia governorate. This lake locates to the south of Ismailia city within latitudes 30◦ 32\ and 30◦ 36\ N and longitudes 32◦ 16\ and 320◦ 21\ E. It has an area of about 8 km2 with average depth of 10m [6]. The objective of this study is to estimate a nutrient profile the of Egyptian cichlid fishes in Lake Timsah.

Materials and methods

Three samples of each species were collected by contacting with local fishermen. The samples were collected during the period from June 2018 to December 2019. The tissue digestion was carried by two methods: HNO3 digestion method for K, Na, and P [7] and dry ashing for Ca and Mg [8]. Phosphorus was determined using spectrophotometer model 22. Sodium and Potassium were determined by flame photometer model PFP. Calcium and Magnesium were determined by atomic absorption spectrophotometer model Perkin Elmer 2308. Both of Calcium and Magnesium were analyzed in Toxicity Unit in the Faculty of Science (Suez Canal University) and Potassium, Sodium and Phosphorus were analyzed in the central laboratory of the faculty of agriculture in Suez Canal University.

The concentration of each nutrient was calculated according to the following equation:

$$\mathbf{c = (a \times df \times b)/m} \quad [9]$$

Where,

C (mg/kg) = concentration in the test sample

a (mg/L) = concentration in the test solution
df = dilution factor
b (mg/L) = mean concentration in the blank solution
m = weight of the test portion (g)
Statistical analyses: Microsoft Excel program (Office 365) was used to detect the mean, standard deviation (Sd) and SPSS software program (IBM SPSS Statistics 22 subscription 64-bit edition for windows) was used to perform one – way ANOVA test.

Results and discussion

The results showed a significant difference between the nutrients concentrations within the same species and the nutrients concentration between the species ($0.01 < P < 0.05$) (Fig. 1).
The results showed that, the highest nutritional species was *S. galilaeus* and the lowest one was *O. niloticus.* The concentration of Potassium (K) ranged from 637 – 887 mg/ Kg, sample of *S. galilaeus* was the highest and the sample of *O. niloticus* was the lowest with a significant difference between them ($P < 0.05$). Mogobe, et al [10] in Botswana reported the same range of Potassium concentrations. In contrast the present with lower than those of Kumar and Ranjan [11] in India, Kiczorowska, et al. [12] in Poland and Lilly, et al. [13] in India.

The concentrations of Sodium (Na) showed a significant difference among the four studied species ($P < 0.05$). The highest concentration was for *S. galilaeus* sample (696 mg/Kg) and the lowest one was for *O. niloticus* sample (485 mg/Kg). the study results are higher than those of Mogabe, et al. [10] in Botswana while the studies of Kumar and Ranjan [11] in India, Kiczorowska, et al. [12] in Poland and Lilly, et al. [13] in India recorded higher results than the present work results.

The study results uncovered that both content of phosphorous (P) and magnesium (Mg) of studied fish species were between 91 and 136 mg/kg; 36 and 241 mg/kg respectively with a significant difference between the concentrations ($P < 0.05$). Kumar and Ranjan [11] stated lower concentrations of Calcium in India than the present study concentrations. In contrast of what stated by Mogobe, et al. [10], Kiczorowska, et al. [12] and Lilly, et al. [13] in Botswana, India, and Poland respectivelly.

The lowest concentration of Magnesium (Mg) (338 mg/Kg) was examined from *O. niloticus* and highest (1057 mg/kg) in *S. galilaeus* and the difference was statistically different ($P < 0.05$). The concentrations of Mg from the present work were within range of the concentration found by Kiczorowska, et al. [12] in Poland. While the Mg concentrations were higher than the same element concentrations recorded by Mogobe, et al [10], Lilly, et al. [13] and Kumar and Ranjan [11] in Botswana and India respectively.

The difference in mineral concentrations in the water body, fish physiological state and the capability of the fish to absorb the minerals from their food and surrounding water all of these reasons cause the fluctuation of the minerals concentration in fish muscles [14,15].

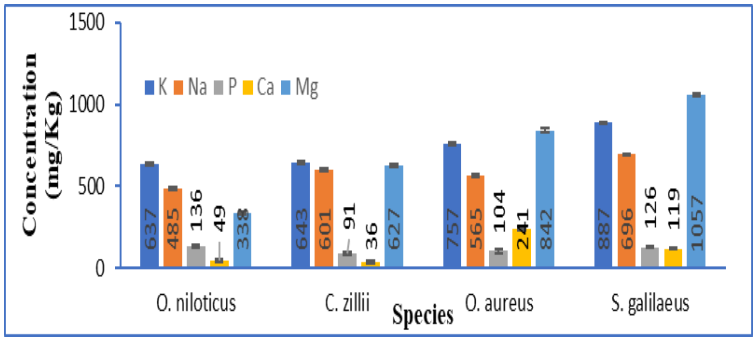

Fig 1: Concentration of nutrients among studied species

Conclusions

The present work concludes the following: there is a fluctuation in the abundance of nutrient elements among cichlid species in Lake Timsah, Egypt. the difference in the abundance of nutrient elements among the four studied species may be caused by the difference between the species for absorbing nutrients from surrounding environment. The study reveals that studied species are rich source of nutrients.
The research also providing upgrade information about nutrient content of fish edible parts to food composition database and consumers can get adequate knowledge in the nutrient contents of cichlid species.

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